

Chapter

6

Statistics in Daily Life

Learning Objectives

After completing this chapter, you will be able to

- know the various stages involved in statistics.
- recognize the ways to collect data and organize data.
- construct and interpret statistical diagrams including pictograms, bar charts, compound bar charts, broken-line graphs, pie charts and stem-and-leaf diagrams.
- describe and predict the trends from broken-line graphs.
- compare the presentations of the same set of data by using same type of graphs but with different scales.
- use computer software to construct statistical diagrams.



1



2



3



4

The following table shows the number of tiles for each letter in a Scrabble.

Letter	Number of tiles	Letter	Number of tiles
A	9	O	8
B	2	P	2
C	2	Q	1
D	4	R	6
E	12	S	4
F	2	T	6
G	3	U	4
H	2	V	2
I	9	W	2
J	1	X	1
K	1	Y	2
L	4	Z	1
M	2	Blank	2
N	6		

Why are the number of tiles not the same for each letter?



Preview

[Basic knowledge and technique required for this chapter.]

A. Basic Knowledge

1 round angle = 360°

B. Basic Technique

Percentages

Example: What percentage of 60 is 24?

$$\begin{aligned}\text{Solution: Required percentage} &= \frac{24}{60} \times 100\% \\ &= \underline{\underline{40\%}}\end{aligned}$$

Example: What is 30% of 120?

$$\begin{aligned}\text{Solution: } 30\% \text{ of } 120 &= 120 \times 30\% \\ &= \underline{\underline{36}}\end{aligned}$$

6.1 Statistical Work

In daily life, we often come across statistical results involving different types of **data** such as popularities of government officers or audience rating of television programmes etc. So, how are these data collected and organized? And how should we interpret them? The study dealing with the above is known as **statistics**.



data 數據

statistics 統計學

Consider the following situation.

Mr. Chan, the S1A class teacher, received many complaints from the students recently, saying that there were too many homework assignments. In order to look into the actual situation, he conducted a survey with steps as follows:

◀ Aim of the survey: To investigate whether S1A students have too many assignments.

1. Collect the record of the number of assignments each day for the past four weeks.

Number of assignments of S1A students each day

	Mon	Tue	Wed	Thu	Fri
1st week	3	5	4	5	6
2nd week	4	4	5	3	5
3rd week	2	5	4	6	5
4th week	4	2	3	5	5

Figure 6.1

2. Organize the data with a table.

Number of assignments each day	Number of days
2	2
3	3
4	5
5	8
6	2
Total	20

Table 6.1

3. Use a diagram to present the data in Table 6.1.

Number of assignments of S1A students each day

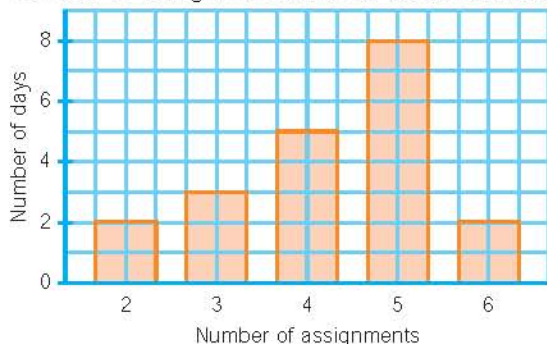
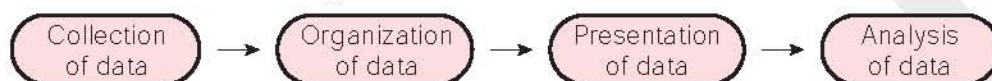


Figure 6.2


4. Analyze the diagram and draw conclusions.
 - (a) S1A students have assignments every day.
 - (b) S1A students always have 4 to 5 assignments every day.

Mr. Chan discussed these findings with teachers of other subjects, and they agreed that students were having too many assignments. To ensure students would have no more than 4 assignments each day, they decided to check the assignment record on the notice board before giving assignments.

From the above example of using statistics to solve problems, we can see that there are four stages involved in statistics:



Extension 6.1

 Conduct a statistical survey to investigate the number of brothers and sisters your classmates have.

- (a) Collection and organization of data

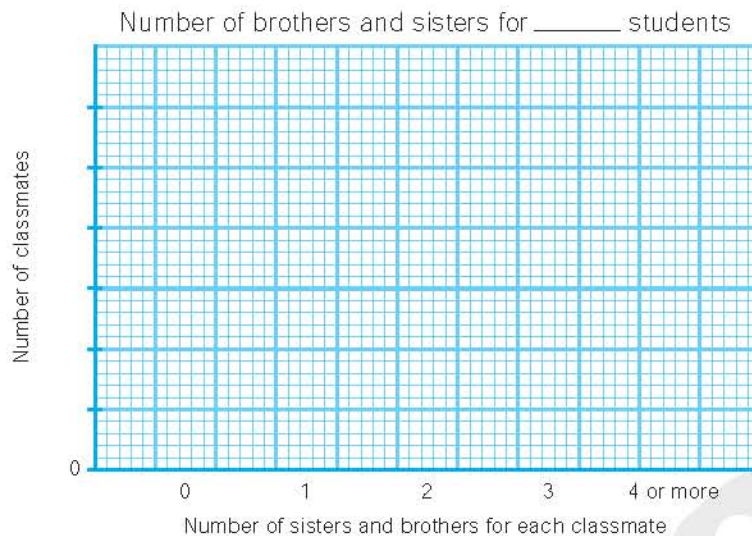
With the help of teacher, collect the following data from the whole class through a show of hands.

Number of brothers and sisters	Number of classmates
0	
1	
2	
3	
4 or more	
Total	



(b) Presentation of data

Draw a bar chart to present the above data.



(c) Analysis of data

Most of the classmates have _____ brothers and sisters.

Very few classmates have _____ brothers and sisters.

6.2 Collection and Organization of Data

A Collection of data

At the beginning of a survey, we have to identify the surveying targets and the data to be collected according to the aim of the survey. The following are five common data collection methods.

◀ In the previous section, the surveying targets of Mr. Chan were the S1A students and the data collected were the number of assignments given to students each day in the past four weeks.

I. Reading records

Obtain the required data by reading available records.

e.g. Check from the cinema the *box office* record of a film for the past ten days.



box office 票房

II. Observation

Without affecting the surveying targets, obtain the required data by counting or measuring through observation.

e.g. Observe the number of different types of vehicles passing by a certain location in an hour.



III. Experiment

Obtain the required data by conducting experiments on the surveying targets.

e.g. Measure the *life-spans* of different kinds of energy-saving bulbs.



IV. Interview

Obtain the required data by conducting phone interviews, street interviews or household interviews.

e.g. Interview people on their opinions about the air quality in Hong Kong.



V. Questionnaire

Obtain the required data by inviting people to fill in questionnaires.

e.g. Distribute questionnaires to your classmates to investigate their opinions on the use of air-conditioners during November and December.



Extension 6.2

Refer to the five data collection methods above, choose the suitable one(s) for each of the following statistical items.

- The number of late arrivals in each of the S1 classes this school year
- The number of people entering a bookstore at different times yesterday
- The level of *radiation* emitted by different brands of mobile phones
- The opinions of the customers about the service quality of a restaurant
- The favourite brands of sport shoes with teenagers in Hong Kong

life-span 壽命

radiation 輻射

B Organization of data

After collecting the required data, how should we organize them?

Imagine you are conducting a survey on the favourite types of television programmes. Below are the replies from 48 people.

N	N	D	F	V	F	S	O	
D	N	V	D	D	F	V	N	
S	D	N	V	D	F	F	D	
D	D	V	N	F	D	N	D	
F	V	N	N	O	N	D	S	
N	S	F	D	D	D	N	D	

D: Drama
F: Film
N: News
S: Sports
V: Variety shows
O: Others

Figure 6.3

By direct observation, we cannot get an overall idea on the distribution of the above data. Therefore, we must organize them in order to obtain useful information.

For example, we can use tallies to record the number of people for each type of programme, with a tally ‘/’ representing each count and every 5 tallies marked as ‘~~###~~’ to make the counting easier. According to the total number of people for each type of programme (**frequency**), we can then construct a **frequency distribution table** as follows.

Type	Tally	Frequency
Drama	### ### ### /	16
Film	### ///	8
News	### ### //	12
Sports	////	4
Variety shows	### /	6
Others	//	2
Total		48

Table 6.2

Using tallies can help keep counting accurate.

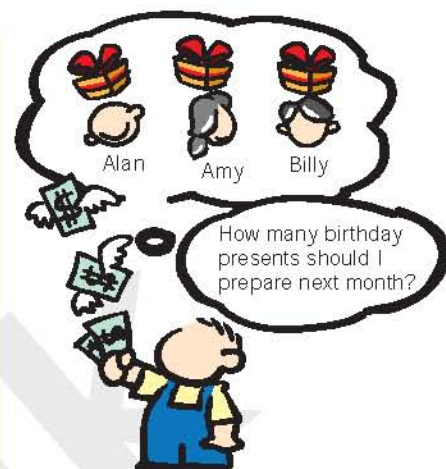


From the above frequency distribution table, it can be clearly seen that this group of people like drama the most.

Extension 6.3

Record the number of your classmates born in each month.

Month of birth	Tally	Frequency
January		
February		
March		
April		
May		
June		
July		
August		
September		
October		
November		
December		
Total		



Skills Upgrading Corner 6.1

The following shows the tea set menu in Pearl Restaurant.

Pearl Restaurant			*One free drink for each tea set		
Special Tea Set		Toast/Sandwich Tea Set		Instant Noodle Tea Set	
A. Hot Dog	\$13	1. Toast	\$12	I. Ham and Egg Noodles	\$16
B. Cheeseburger	\$13	2. Ham Sandwich	\$13	II. Sausage and Egg Noodles	\$16
C. Chicken Wingettes (4 pcs)	\$15	3. Luncheon Meat Sandwich	\$13	III. Luncheon Meat and Egg Noodles	\$16
D. Fried Chicken Leg	\$15	4. Egg Sandwich	\$13	IV. Chicken Wing Noodles	\$18
E. Dumplings & French Fries	\$16	5. Cheese Sandwich	\$13	V. Pork Chop Noodles	\$18
F. Dumplings & Salad	\$16	6. Ham and Egg Sandwich	\$15		
G. Chicken Wing & French Fries	\$17	7. Luncheon Meat and Egg Sandwich	\$15		
H. Chicken Wing & Salad	\$17	8. Cheese and Ham Sandwich	\$15		
I. Pork Chop & French Fries	\$17				
J. Pork Chop & Salad	\$17				



- (a) Record the number of tea sets with different prices using a frequency distribution table.
 (b) What data collection method is used to obtain the data in (a)?

Exercise 6A

Level 1

- Refer to the five data collection methods mentioned in this chapter (reading records, observation, experiment, interview and questionnaire), choose the suitable one(s) for each of the following statistical activities.

- To investigate the favourite ball games with S1 students
- To investigate the amount of *impurities* in 30 brands of distilled water
- To study the change in the sales volume of a car company over the past six months
- To investigate the public opinions about implementing *pedestrian schemes* in Wan Chai
- To find the number of students passing the Mathematics examination in each of the S1 classes
- To find the number of customers in a restaurant during lunch hours over seven days
- To conduct Hong Kong *Population By-census*
- To investigate the favourite cartoons with kindergarten students



- The figure on the right shows a screenshot of a computer game. Record the number of each figure using the frequency distribution table below.

Figure	Tally	Frequency
☆		
△		
□		
+		
○		
Total		

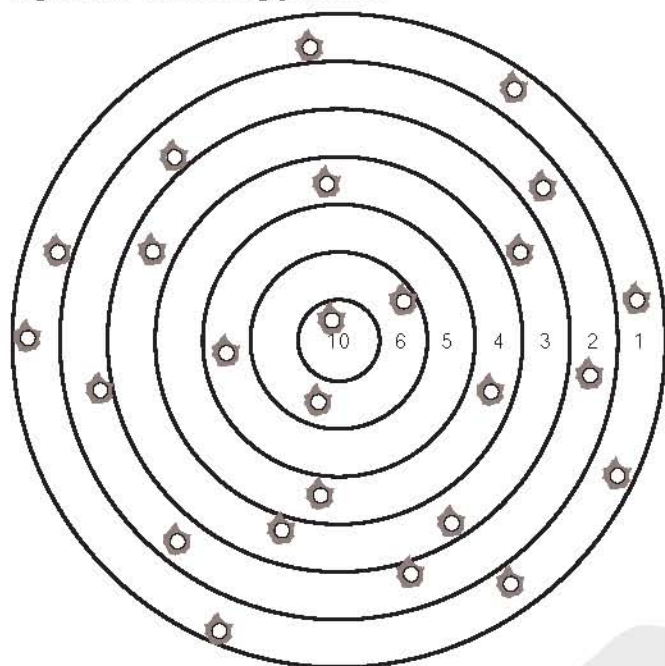
☆	△	□	+	○	○
☆	☆	□	△	□	○
○	△	△	□	△	□
△	+	☆	+	□	○
□	△	+	☆	+	△
△	○	○	□	☆	△

- The following are the scores of 35 children in a story-telling competition. Organize these data with a frequency distribution table.

7 5 8 7 8 9 7 6 8 7
 3 7 6 6 7 7 6 5 6 7
 7 9 7 8 8 10 6 8 8 6
 7 8 7 5 4

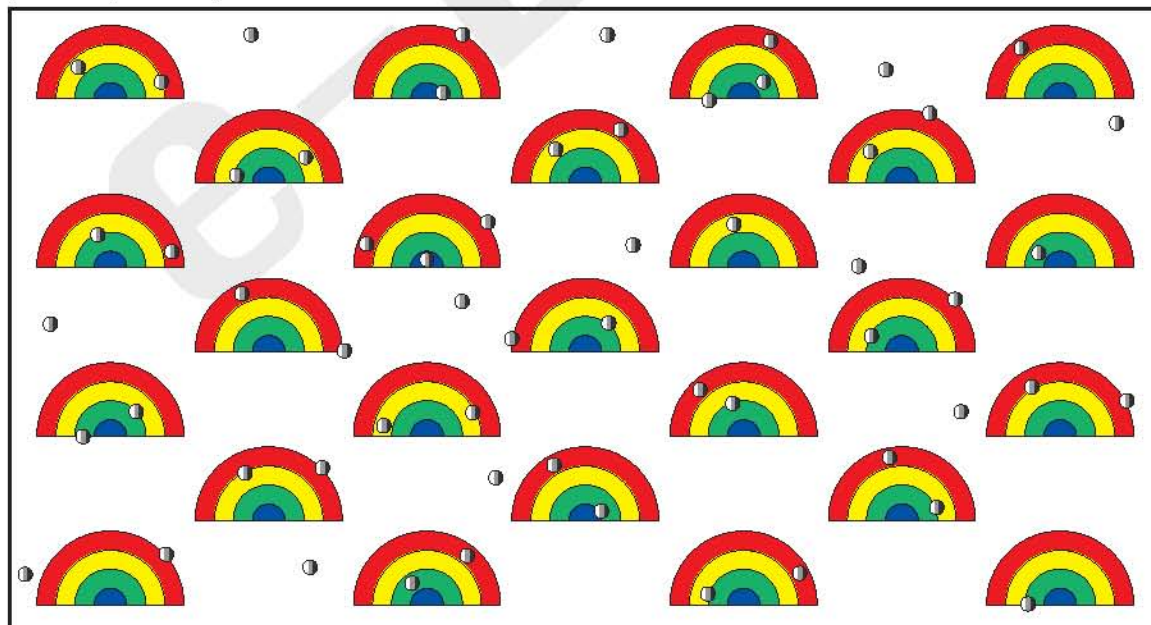
impurity 雜質
 pedestrian scheme 行人專用區
 Population By-census 中期人口普查

4. Using a frequency distribution table, record the number of times John has hit each of the following regions in a shooting practice.



Level 2

5. In the following game, anyone with the tossed coin falling entirely within the red, yellow, green or blue region without touching an edge will be awarded a *consolation prize*, small prize, large prize or special prize respectively.



- (a) Based on the figure above, record the number of each type of prizes awarded using a frequency distribution table.
 (b) What data collection method is used to obtain the data in (a)?

consolation prize 安慰獎

6. The following shows the sales of different kinds of fruit juices yesterday.

P	O	W	P	O	O	A	O	P	W
A	O	O	P	A	W	A	P	A	P
O	P	P	W	P	O	P	A	W	O
W	P	O	O	P	O	A	O	P	O
A	O	W	O	P	O	P	P	O	P

A: Apple juice
O: Orange juice
P: Pear juice
W: Watermelon juice

- Organize the above data with a frequency distribution table.
- If both apple juice and pear juice are \$7 each, and both orange juice and watermelon juice are \$6 each, find the total amount obtained from selling fruit juices yesterday.

6.3 Presentation and Analysis of Data

After the data are organized, we can use diagrams to present them. Diagrams not only can show the overall patterns of the data, their changes or trends, but also make the presentation more attractive and easier to understand.

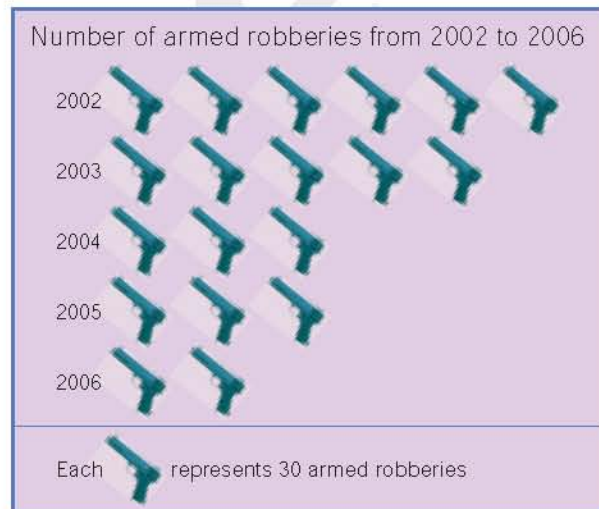
The following are some examples of using diagrams to present data.

A Pictograms

In a **pictogram**, the frequency of each item is represented by pictures.

Example 6.1 Interpreting pictograms

The following pictogram shows the number of *armed robberies* from 2002 to 2006.




pictogram 象形圖


Classwork 6.1

The following pictogram shows the number of set meals sold in Burger World in a day.




- What is the title of the pictogram?
- In the pictogram, how many set meals does each  represent?
- Which set meal was the most popular? How many sets were sold?

armed robbery 持械行劫案

- (a) What is the title of the pictogram?
- (b) In the pictogram, how many armed robberies does each  represent?
- (c) Which year had the most frequent armed robberies? How many armed robberies were there in that year?
- (d) Was the number of armed robberies increasing or decreasing between 2002 and 2006?

Solution

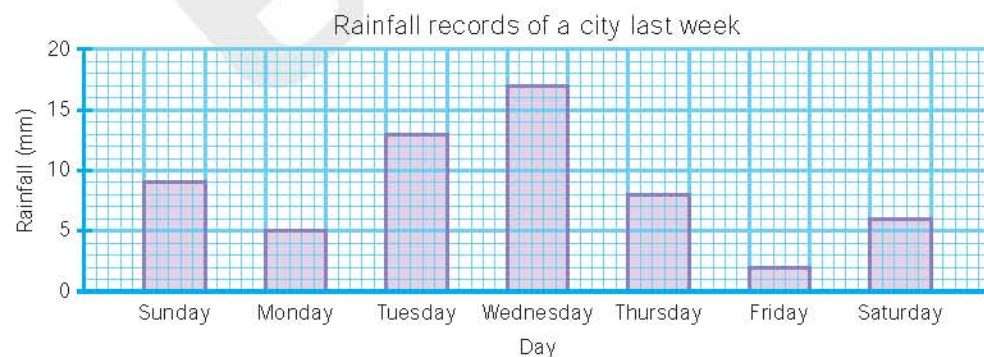
- (a) The title of the pictogram is 'Number of armed robberies from 2002 to 2006'.
- (b) Each  represents 30 armed robberies.
- (c) 2002 had the most frequent armed robberies.
 Number of armed robberies = 6×30
 = 180
- (d) The number of armed robberies was decreasing between 2002 and 2006.

Bar charts

Although a pictogram is easy to read and understand, it is not easy to draw. A **bar chart** can overcome this problem.

Example 6.2 Interpreting bar charts

The following bar chart shows the rainfall records of a city last week.



- (a) Which day had the heaviest rainfall? Which day had the lightest rainfall?
- (b) What is the difference between the rainfall on Saturday and Sunday?
- (c) Find the total rainfall last week.

bar chart 棒形圖

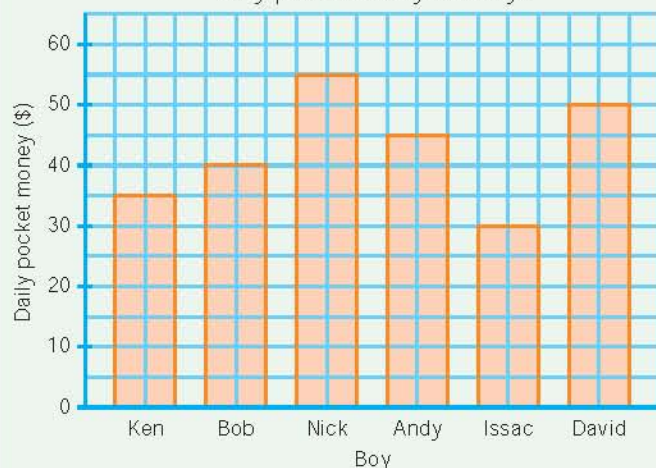
Solution

- (a) Wednesday had the heaviest rainfall and Friday had the lightest rainfall.
- (b) Difference between the rainfall on Saturday and Sunday
 $= (9 - 6) \text{ mm}$
 $= \underline{3 \text{ mm}}$
- (c) Total rainfall
 $= (9 + 5 + 13 + 17 + 8 + 2 + 6) \text{ mm}$
 $= \underline{60 \text{ mm}}$

**Classwork 6.2**

The following bar chart shows the daily pocket money of 6 boys.

Daily pocket money of 6 boys



- (a) Who has the largest amount of daily pocket money? Who has the least amount of daily pocket money?
- (b) What is the difference between the amounts of daily pocket money of Ken and David?
- (c) Find the total amount of daily pocket money among the six of them.

C Compound bar charts

If we have to show more than one set of data in one bar chart, we can use a **compound bar chart**.

compound bar chart 綜合棒形圖

Example 6.3 Interpreting compound bar charts

The following compound bar chart shows the score of each team in a competition.



The bars in the graph not only show the total score of each team, but also the score in each round.



- Which two teams have the same total score in the two rounds?
- Which team has a score of 200 in the first round? What is the score of this team in the second round?
- What percentage of the total score of Yellow team is obtained in the first round?

Solution

- (a) Yellow team and Blue team have the same total score in the two rounds.

- (b) Red team has a score of 200 in the first round.

$$\begin{aligned}\text{Score of Red team in the second round} &= 440 - 200 \\ &= \underline{\underline{240}}\end{aligned}$$

- (c) Yellow team has a score of 280 in the first round, and its total score in the two rounds is 400.

$$\begin{aligned}\therefore \text{Required percentage} &= \frac{280}{400} \times 100\% \\ &= \underline{\underline{70\%}}\end{aligned}$$

Classwork 6.3

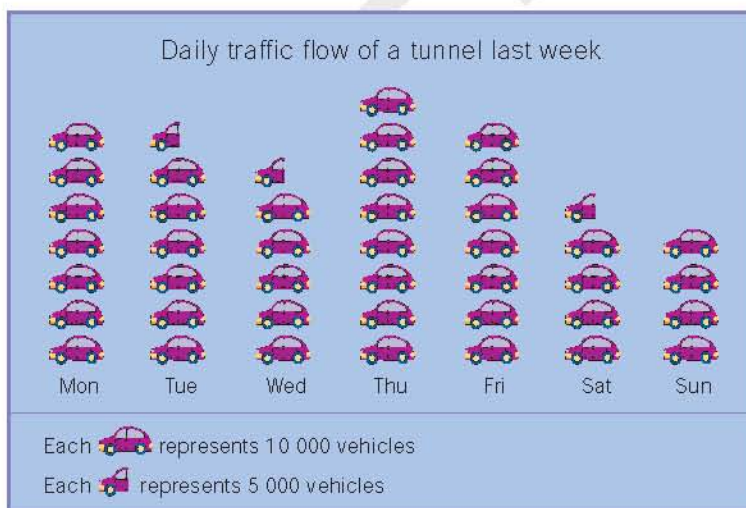
The following compound bar chart shows the income and expenditure of a salesman over five months.



- In which month was the expenditure of this salesman more than income?
- In which month did this salesman have an income of \$8 800? What was his expenditure that month?
- What is the difference between the income and the expenditure of this salesman in April?
- In May, what percentage of the income of this salesman is his expenditure?

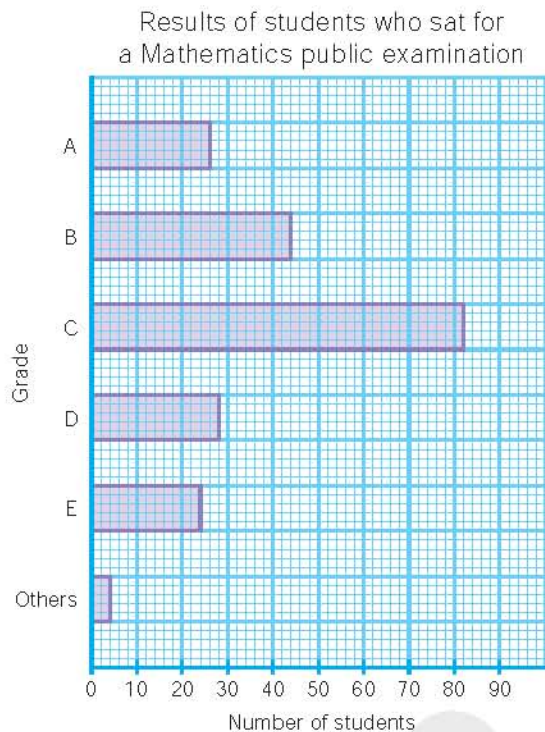
Skills Upgrading Corner 6.2

- The following pictogram shows the daily traffic flow of a tunnel last week.



- In the pictogram, how many vehicles does each represent?
- Which day had a traffic flow of 55 000 vehicles?
- Which two days had the same traffic flow? What was the daily traffic flow?
- Find the total traffic flow from Monday to Friday.

2. The following bar chart shows the results of students of a school who sat for a Mathematics public examination.



The rectangular bars of a bar chart can also be shown horizontally.



- (a) Which grade was obtained by more than 50 students?
 (b) How many students sat for this Mathematics public examination?
 (c) What percentage of these students obtained grade A?
3. The following compound bar chart shows the number of students from six secondary schools joining the Speech Festival.



- (a) Complete the following table.

Secondary school	Number of boys	Number of girls	Total number of students
A			
B			
C			
D			
E			
F			

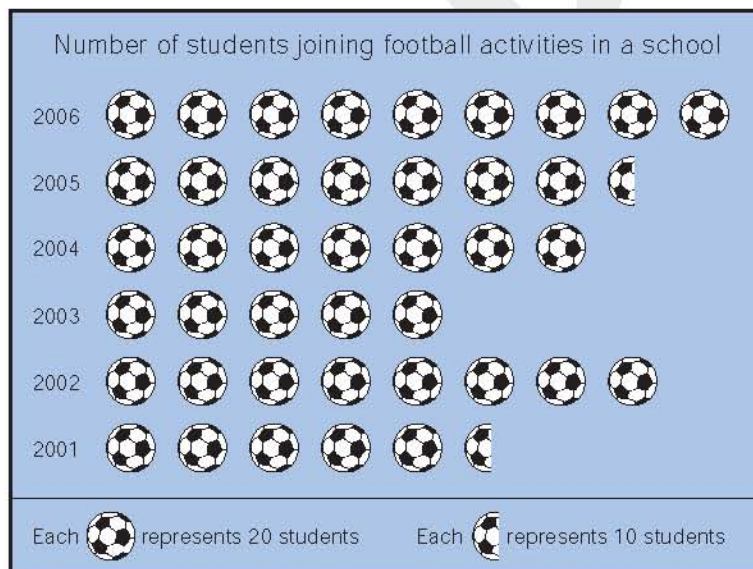
- (b) Consider the total number of students from these six secondary schools joining the Speech Festival, what percentage of them are boys?




Exercise 6B

Level 1

1. The following pictogram shows the number of students joining football activities in a school.



- (a) What is the title of the pictogram?
- (b) In the pictogram, how many students does each  represent?
- (c) In which year were there 110 students joining football activities?
- (d) In which year were there the fewest students joining football activities? How many students joined football activities that year?

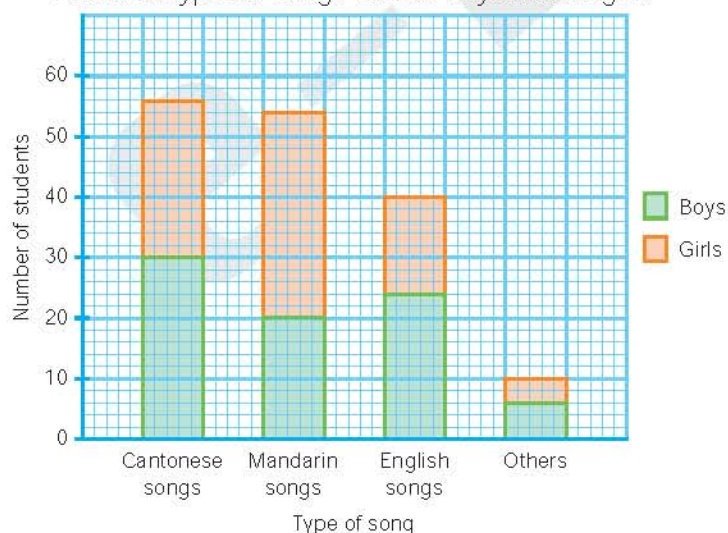
2. The following bar chart shows the number of students who have passed the oral examination in each of the S1 classes.

Number of students who have passed the oral examination
in each of the S1 classes



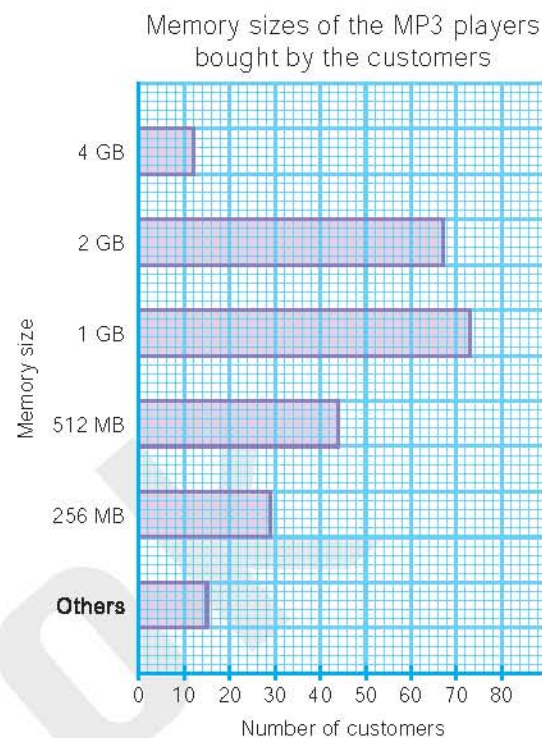
- Which two classes have the same number of students passing the oral examination?
 - Which classes have more than 25 students passing the oral examination?
 - In total how many S1D and S1E students have passed the oral examination?
3. The following compound bar chart shows the favourite types of songs with 80 boys and 80 girls.

Favourite types of songs with 80 boys and 80 girls



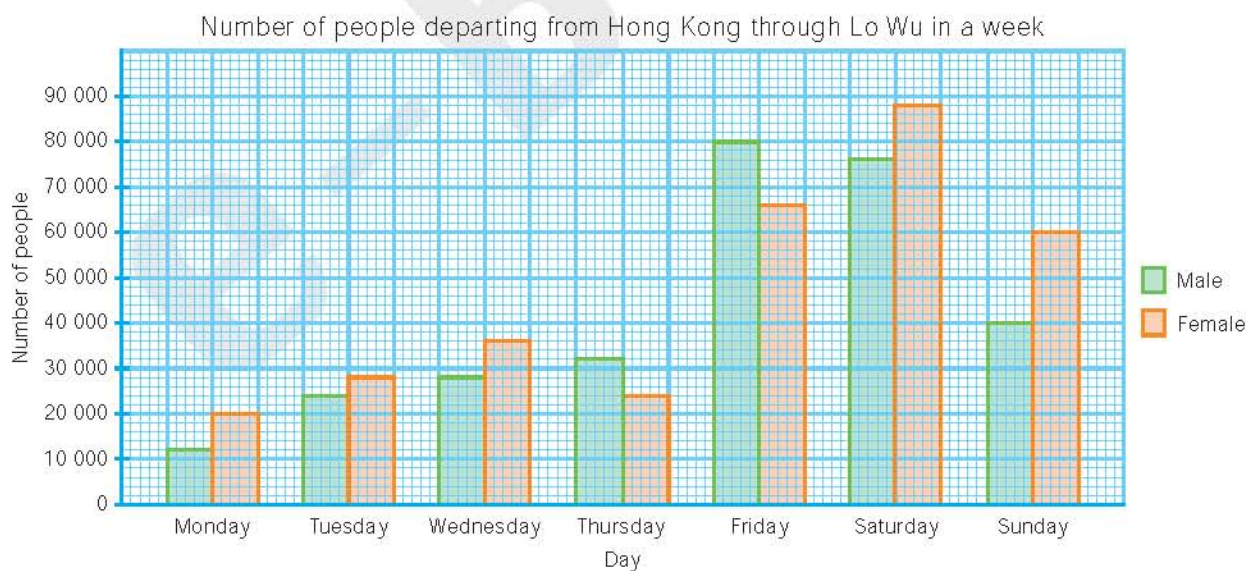
- Which type of songs do these students like the most?
- How many students like other types of songs?
- Find the respective number of boys and girls who like Mandarin songs.
- Consider the students who like English songs, what percentage of them are boys?

4. The bar chart on the right shows the memory sizes of the MP3 players bought by the customers in a shop last week.
- Which two memory sizes were the most popular?
 - How many more customers bought MP3 players with memory size of 512 MB than those with memory size of 256 MB?
 - Find the total number of customers who bought MP3 players in this shop last week.
 - What percentage of these customers bought MP3 players with memory size of 4 GB?



Level 2

5. The following compound bar chart shows the number of people departing from Hong Kong through Lo Wu in a week.

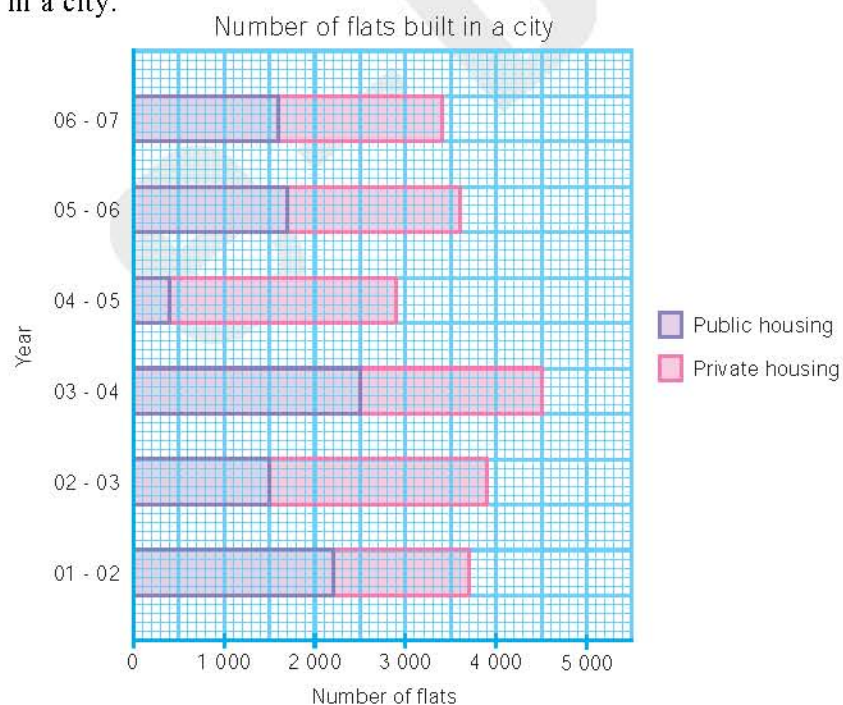


- On which days were there more males than females departing from Hong Kong through Lo Wu?
- On which day were there the largest number of people departing from Hong Kong through Lo Wu?
- How many more people departed from Hong Kong through Lo Wu on Tuesday than on Monday?
- Consider the people who departed from Hong Kong through Lo Wu on Sunday, what percentage of them are females?

6. The following pictogram shows the number of umbrellas sold in Perfect Department Store last year.



- Which months have fewer than 50 umbrellas sold?
 - Find the total number of umbrellas sold in the first six months.
 - What percentage of the umbrellas sold last year were sold in July?
 - According to the pictogram, which three months do you think are the rainy season? Explain briefly.
7. The following compound bar chart shows the number of flats built in a city.



- How many more public housing flats were built in 03 - 04 than in 02 - 03?
- In 04 - 05, how many more private housing flats were built than public housing flats?
- What percentage of the flats built in 01 - 07 were private housing flats?

D Broken-line graphs

In statistics, a **broken-line graph** is usually used to show the changes in data across time, so that readers can see the trend of the data easily.

e.g. Table 6.3 records the number of vehicles parked in a carpark at different times yesterday.

Time	8 a.m.	12 noon	4 p.m.	8 p.m.	12 a.m.
Number of vehicles	56	16	18	32	60

Table 6.3

Use the horizontal axis to represent the time and the vertical axis to represent the number of vehicles, mark on a graph paper the number of vehicles parked in the carpark at different times yesterday. A broken-line graph can then be obtained by joining the points as follows.

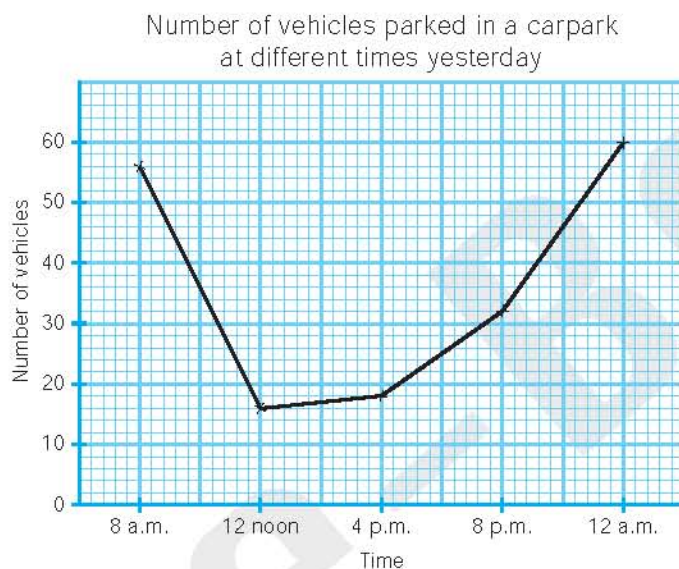


Figure 6.4

From the above broken-line graph, we can clearly see the changes in the number of vehicles parked in the carpark at different times yesterday. The number of vehicles in the carpark decreased rapidly from 8 a.m. to 12 noon, and it increased steadily after 12 noon and reached the maximum at 12 a.m.

When drawing a broken-line graph, the following should be noted.

1. A title should be given.
2. Each datum must be marked with a cross. Adjacent marked points should be joined by a line segment.
3. Both axes must be properly labelled with items and scales (including units).

broken-line graph 折綫圖



[Refer to
page 6.51]

Notes: (a) In a broken-line graph, the line segment between any two marked points only reflects the trend of the data in that period of time. Thus we should not treat them as accurate data.

- (b) When constructing a statistical diagram, an appropriate scale should be chosen so that the properties of the data can be clearly seen. e.g. The broken-line graphs in Figures 6.5(a) and 6.5(b) are drawn according to the same set of data. But obviously, the changes in the stock price of company A in the past five days can be seen more clearly in Figure 6.5(b) than in Figure 6.5(a).

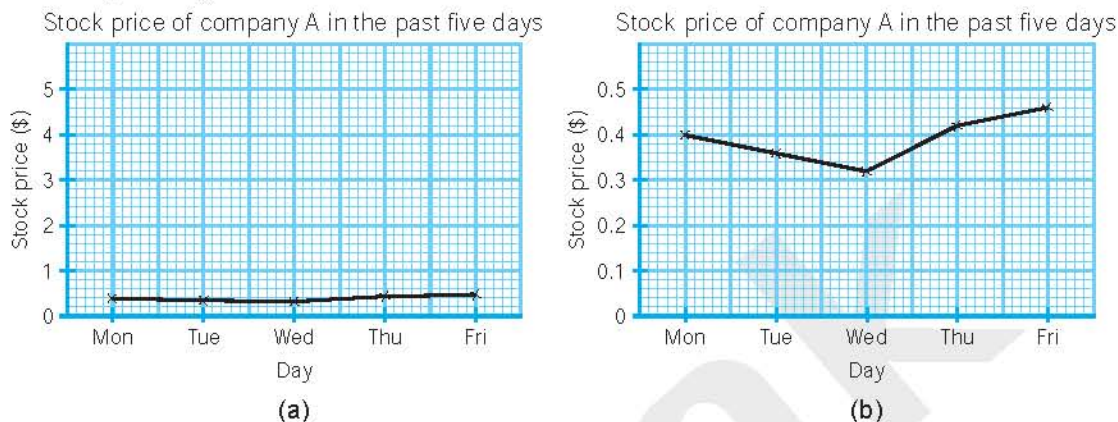
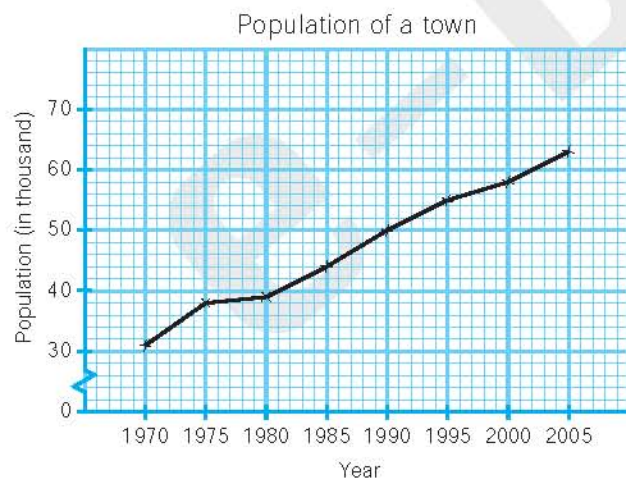


Figure 6.5

Example 6.4 Interpreting broken-line graphs

The following broken-line graph shows the population of a town from 1970 to 2005.



◁ ≻ is a symbol to show that part of the vertical axis is omitted.

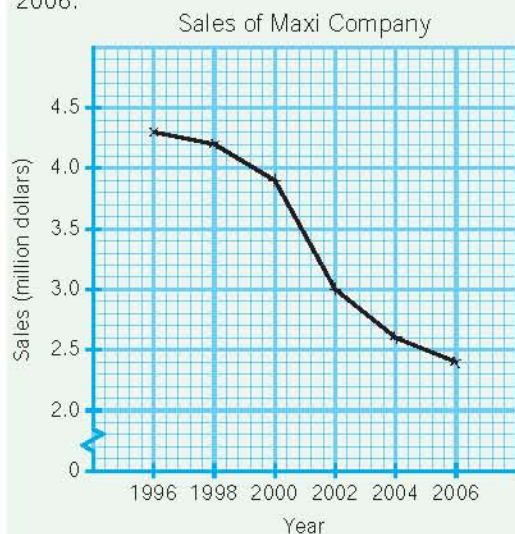
- Write down the population of this town in 1985.
- Estimate the population of this town in 1997.
- The construction of a library started when the population of this town just reached 50 thousand. If the library was completed in one year, in which year was the library completed?
- Describe the changes in the population of this town from 1970 to 2005.

Solution

- (a) The population of this town was 44 thousand in 1985.
- (b) The population of this town was about 56 thousand in 1997.
- (c) \therefore The population of this town just reached 50 thousand in 1990.
 \therefore The construction of the library started in 1990, and completed in 1991.
- (d) According to the graph, the population of this town increased steadily from 1970 to 2005.

**Classwork 6.4**

The following broken-line graph shows the sales of Maxi Company from 1996 to 2006.

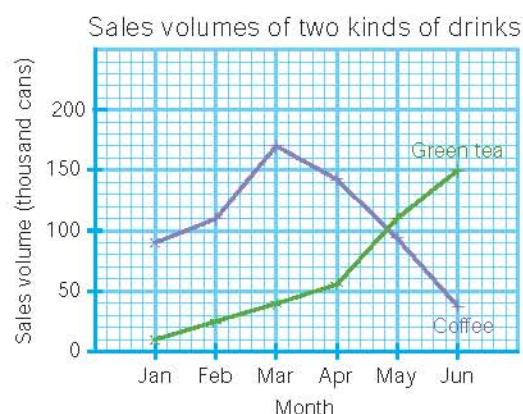


- (a) Write down the sales of the company in 2000.
- (b) Estimate the sales of the company in 2005.
- (c) Between which two years did the sales of the company decrease most rapidly?
 By how much did the sales decrease?
- (d) Describe the changes in the sales of the company from 1996 to 2006.



Example 6.5 Describing and predicting the trend from broken-line graphs

The following broken-line graphs show the sales volumes of two kinds of drinks in the first half of the year.



- Describe the sales volumes of these two kinds of drinks in the first half of the year.
- Predict the trends of the sales volumes of these two kinds of drinks in the second half of the year.

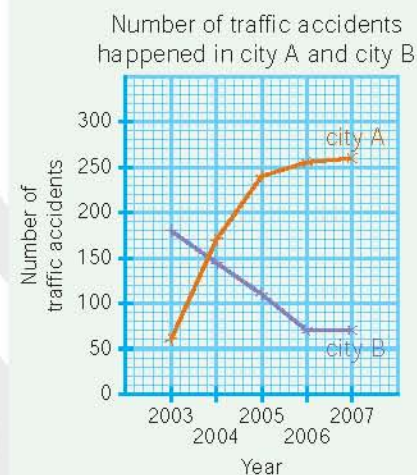
Solution

- According to the graph, the sales volume of coffee increased steadily from January to March, but started decreasing after March. As for green tea, its sales volume increased steadily throughout the first half of the year and even exceeded that of coffee from May onwards.
- According to the graph, it is predicted that the sales volume of coffee will keep decreasing while the sales volume of green tea will keep increasing in the second half of the year.



Classwork 6.5

The following broken-line graphs show the number of traffic accidents happened in city A and city B from 2003 to 2007.



- Describe the condition of traffic accidents happened in the two cities from 2003 to 2007.
- Predict the trends of the number of traffic accidents to be happened in the two cities in 2008.

E Pie charts

A **pie chart** shows the percentage of the whole set of data each item occupies.

e.g. Table 6.4 records the most common means of transport taken by 500 people on Hong Kong Island.

Means of transport	Number of people	Percentage occupied
MTR	225	45%
Bus	125	25%
Minibus	50	10%
Tram	75	15%
Others	25	5%

Table 6.4

According to the above table, we can obtain a pie chart as follows.

Most common means of transport taken
by 500 people on Hong Kong Island

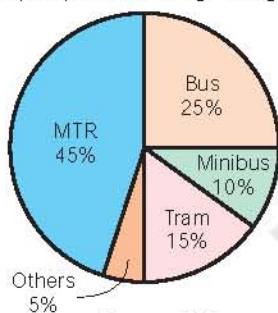


Figure 6.6

In a pie chart, the part representing each item is called a **sector** and the angle included by the two radii of the sector is called angle at the centre.

If an item occupies $n\%$ of the whole, then the angle at the centre of the corresponding sector $= 360^\circ \times n\%$.

Thus, the greater the percentage occupied by an item, the greater are the area and the angle at the centre of the corresponding sector.

e.g. From the above pie chart, we can clearly see that MTR is the most common means of transport, with almost half of the 500 people taking it often.

$$\begin{aligned}\text{Corresponding angle at the centre} &= 360^\circ \times 45\% \\ &= 162^\circ\end{aligned}$$

When drawing a pie chart, the following should be noted.

1. A title should be given.
2. The item represented by each sector must be clearly labelled with symbols or text.

sector 扇形



[Refer to page 6.53]

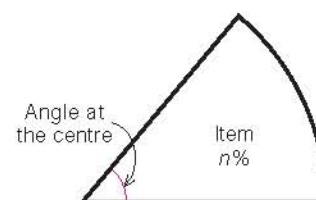


Figure 6.7

Example 6.6 Constructing pie charts

The following table records the blood types of 800 blood donors. Use a pie chart to present these data.

Blood type	Number of donors
A	200
B	220
O	320
AB	60

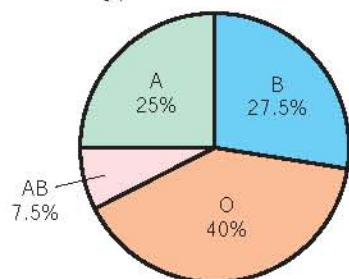
Solution

[Analysis: Calculate the percentage occupied by each blood type and find the corresponding angle at the centre, then draw each sector according to its angle at the centre.]

Blood Type	Number of donors	Percentage occupied	Angle at the centre
A	200	$\frac{200}{800} \times 100\% = 25\%$	$360^\circ \times 25\% = 90^\circ$
B	220	$\frac{220}{800} \times 100\% = 27.5\%$	$360^\circ \times 27.5\% = 99^\circ$
O	320	$\frac{320}{800} \times 100\% = 40\%$	$360^\circ \times 40\% = 144^\circ$
AB	60	$\frac{60}{800} \times 100\% = 7.5\%$	$360^\circ \times 7.5\% = 27^\circ$

According to the above table, a pie chart can be obtained as follows.

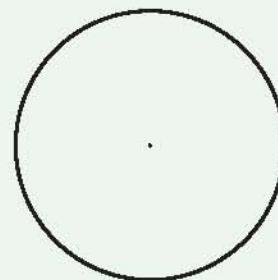
Blood types of 800 blood donors



Classwork 6.6

The following table records the weather of a city over the past 300 days. Use a pie chart to present these data.

Weather	Number of days
Sunny	195
Cloudy	45
Rainy	60

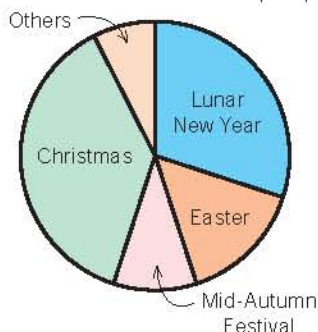




Example 6.7 Interpreting pie charts

The following pie chart shows the favourite festivals with 120 people.

Favourite festivals with 120 people



- Measure the size of the angle at the centre corresponding to each festival in the pie chart.
- Which festival do these people like the most? What percentage of these people like this festival?
- How many people like Easter?

Solution

- By measuring the angle at the centre corresponding to each festival with a protractor, we get

Festival	Angle at the centre
Lunar New Year	108°
Easter	54°
Mid-Autumn Festival	36°
Christmas	135°
Others	27°

- These people like Christmas the most.

$$\begin{aligned}\text{Required percentage} &= \frac{135}{360} \times 100\% \\ &= \underline{\underline{37.5\%}}\end{aligned}$$

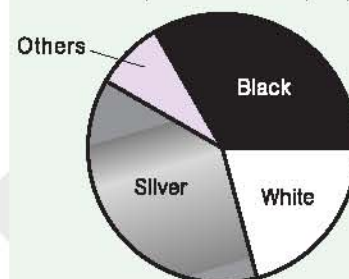
- Number of people who like Easter = $120 \times \frac{54}{360}$
= 18



Classwork 6.7

The pie chart shows the colours of the mobile phones of 240 people.

Colours of the mobile phones of 240 people



- Measure the size of the angle at the centre corresponding to each colour.
- What is the most common colour among the mobile phones of these people? What percentage of people are having mobile phones in this colour?
- How many people are having mobile phones in white?

F Stem-and-leaf diagrams

In a **stem-and-leaf diagram**, we separate the digits of each numerical datum into two parts, the 'stem' and the 'leaf', where the stem refers to the leading digit(s) and the leaf refers to the remaining digit(s).

e.g. Consider the number of items sold in shop A over ten days.

31, 37, 40, 24, 45, 58, 49, 16, 33, 45

We can construct a stem-and-leaf diagram according to the steps below.

- 1** Arrange the data in ascending order.

16, 24, 31, 33, 37,
40, 45, 45, 49, 58

- 2** Take the tens digits as the stems and the units digits as the leaves, present the data as follows.

Stem (tens)	Leaf (units)
1	6
2	4
3	1
3	3
3	7
4	0
4	5
4	5
4	9
5	8

Table 6.5

- 3** Write the leaves corresponding to the same stem on the same row in ascending order from left to right. A stem-and-leaf diagram can then be obtained.

Number of items sold in shop A over ten days

Stem (tens)	Leaf (units)
1	6
2	4
3	1 3 7
4	0 5 5 9
5	8

Figure 6.8

From this angle, the stem-and-leaf diagram looks like a bar chart.

Having understood the steps in constructing a stem-and-leaf diagram, we only have to consider how to separate the data into two parts without a need to draw the table in step (2).



[Refer to page 6.55]

From the above stem-and-leaf diagram, we can clearly see the distribution of the data. Over these ten days, shop A usually sold 30 to 49 items each day, with a maximum of 58 items and a minimum of 16 items.

When drawing a stem-and-leaf diagram, the following should be noted.

1. A title should be given.
2. The numbers represented by the stems should be listed in ascending order, from top to bottom. Each number should be written once only.
3. The numbers represented by the leaves should be listed in ascending order, from left to right. Each number can be written more than once.
4. The place values represented by the stems and leaves should be clearly stated with units.



Extension 6.4

The following are the weights of 20 lemons. Use a stem-and-leaf diagram to present these data.

54 g 55 g 55 g 58 g 58 g 59 g 59 g 60 g 60 g 62 g
63 g 64 g 65 g 67 g 69 g 70 g 71 g 74 g 75 g 75 g



Weights of 20 lemons	
Stem (10 g)	Leaf (1 g)

**Example 6.8**

Interpreting stem-and-leaf diagrams which involve leaves with one digit only

The following stem-and-leaf diagram shows the amount spent by 30 people on lunch in a day.

Amount spent by 30 people on lunch in a day

Stem (\$10)	Leaf (\$1)
1	5 6 6 8 9 9
2	0 1 2 2 4 5 5 6 6 6 8
3	0 0 2 6 6 8
4	0 5 8
6	0 8 9
7	8

- Write down the minimum amount spent by these people on lunch that day.
- Consider the amounts spent by these people on lunch, which stem do most of the amounts fall into?
- How many people spent \$26 on lunch?
- How many people spent between \$30 and \$39 inclusive on lunch?

Solution

- The minimum amount spent by these people on lunch that day was \$15.
- Most of the amounts fall into the stem of 2.
- 3 people spent \$26 on lunch.
- 6 people spent between \$30 and \$39 inclusive on lunch.

**Classwork 6.8**

The following stem-and-leaf diagram shows the results of 40 candidates in a written examination (full marks: 150).

Results of 40 candidates in a written examination

Stem (10 marks)	Leaf (1 mark)
5	8 9 9
6	7 7 8 9
7	0 0 1 1 4 4 5
8	0 0 0 1 2 2 7 7 8 8 8 9
9	2 2 3 3 4 5 5 6
10	0 0
11	5 6 6
12	3

- Write down the highest mark of these candidates.
- Which stem do the marks of most of the candidates fall into?
- How many candidates have obtained 100 marks?
- How many candidates have obtained marks between 70 and 79 inclusive?

**Example 6.9**

Interpreting stem-and-leaf diagrams which involve leaves with more than one digit

The following stem-and-leaf diagram shows the distribution of the number of customers visiting different shops in Sunny Shopping Mall within a certain period of time.

Number of customers visiting different shops in Sunny Shopping Mall

Stem (hundreds)	Leaf (units)
0	42 54 62 71 92
1	04 12 17 49 50 61 82
2	01 30 45 71
3	52 69 84 88 93 95
4	31 47 60

- How many shops are there in Sunny Shopping Mall?
- Write down the respective number of customers visiting the five shops with the fewest customers within that period of time.
- What percentage of the shops in Sunny Shopping Mall have more than 200 customers within that period of time?

Solution

- There are 25 shops in Sunny Shopping Mall.
- The respective number of customers are 42, 54, 62, 71 and 92.
- There are more than 200 customers in 13 shops within that period of time.

$$\begin{aligned}\text{Required percentage} &= \frac{13}{25} \times 100\% \\ &= \underline{\underline{52\%}}\end{aligned}$$

Note: In this example, data which fall into the stem 0 are without hundreds digit.

**Classwork 6.9**

The following stem-and-leaf diagram shows the distribution of the heights of all buildings above sea level in a mountain area.

Heights of buildings above sea level	
Stem (100 m)	Leaf (1 m)
0	04 11 22 40 50
1	12 23 24 56 82 89
2	02 07 35 39 62 80 92
3	70 75 83 88
4	20 25

- How many buildings are there in the mountain area?
- Write down the respective heights of the five buildings which are closest to sea level.
- If tap water is only supplied to the buildings with heights less than 250 m above sea level, what percentage of the buildings in the mountain area have no tap water supply?

Example 6.10 Interpreting back-to-back stem-and-leaf diagrams

The following shows the results of S1C students in the first and second Mathematics tests.

Results of S1C students in the first and second Mathematics tests

First test Leaf (1 mark)	Stem (10 marks)	Second test Leaf (1 mark)
	0	3
	1	8
9 8 7 5 5 3 3 2 1 1	2	1 1 2 3 4
9 9 8 7 7 7 4 2	3	0 3 8 8
9 8 3 1 1 0	4	1 1 1 4 4 5 5 7 8
6 6 6 4	5	0 1 2 2 2 3 7 7
8 7 3	6	5 5 7 8 9 9
6 5	7	2 4 7
8 2	8	1 6
3	9	5

- (a) How many students got 23 marks in the first test?
- (b) How many more students got 60 marks or above in the second test than in the first one?
- (c) In which test do you think the S1C students performed better? Explain briefly.

Solution

- (a) 3 students got 23 marks in the first test.
- (b) In the first test,
number of students getting 60 marks or above = $3 + 2 + 2 + 1$
= 8

In the second test,
number of students getting 60 marks or above = $6 + 3 + 2 + 1$
= 12

\therefore There are $12 - 8 = 4$ more students getting 60 marks or above in the second test than in the first one.

- (c) According to the diagram, more students got higher marks in the second test. Thus, S1C students performed better in the second test.

Classwork 6.10

The following shows the monthly average *relative humidity* of city A and city B last year.

Monthly average relative humidity of city A and city B		
City A Leaf (1%)	Stem (10%)	City B Leaf (1%)
2 1	6	0 0 1 2 3
8 5 0 0	7	2 3 4 4
6 5 5 3 2	8	5
1	9	3 9

- (a) In city A, how many months were there with average relative humidity of 70%?
- (b) How many more months were there with average relative humidity above 80% in city A than in city B?
- (c) Which city do you think was drier last year? Explain briefly.

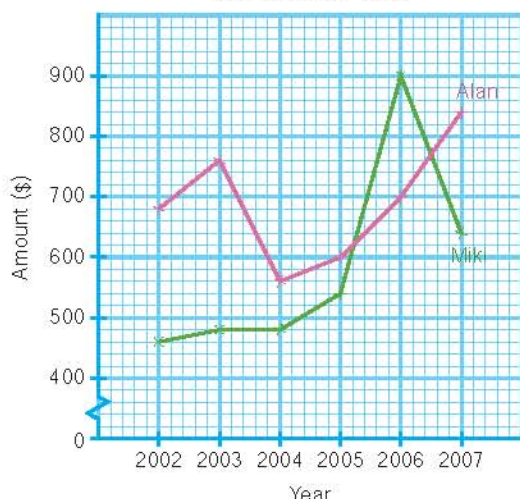
A stem-and-leaf diagram with two sets of data listed on both sides is known as **back-to-back stem-and-leaf diagram**.



Skills Upgrading Corner 6.3

- The following broken-line graphs show the amounts of red packet money of Alan and Miki from 2002 to 2007.

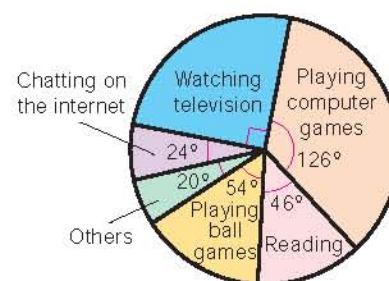
Amounts of red packet money of Alan and Miki



- In which year were the amounts of red packet money of Alan and Miki both less than \$600?
- In which year was the amount of red packet money of Miki more than that of Alan? What is the difference?
- Find the respective total amount of red packet money Alan and Miki got between 2002 and 2007.
- Describe the changes in the amounts of red packet money of Alan and Miki between 2002 and 2007.

- The pie chart on the right shows the favourite extra-curricular activities with S1 students.

Favourite extra-curricular activities with S1 students



- If 45 S1 students like watching television, how many S1 students are there in total?
- What percentage of the S1 students like playing ball games? How many students are there?
- How many S1 students in total, like chatting on the internet and playing computer games?

- The following are the number of SMS sent by Gary and Kevin each month last year.

Gary: 32, 19, 40, 34, 39, 28, 36, 23, 30, 21, 36, 45

Kevin: 27, 30, 18, 22, 42, 26, 30, 18, 20, 35, 29, 24

- Use a back-to-back stem-and-leaf diagram to present the number of SMS sent by the two of them.
- Who do you think sent more SMS in general each month last year? Explain briefly.



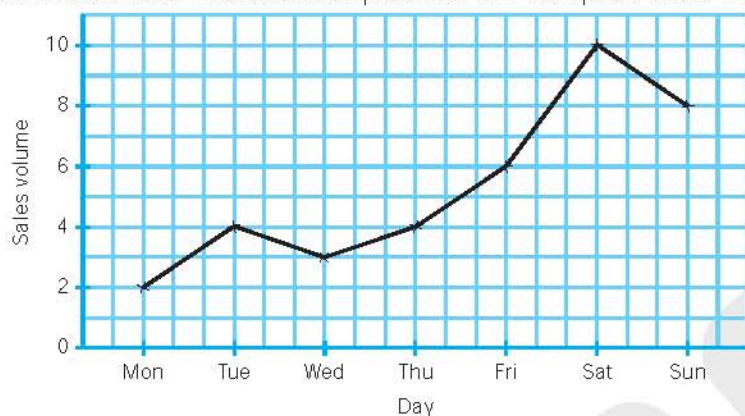


Exercise 6C

Level 1

1. The following broken-line graph shows the sales volume of notebook computers of WH Computer Store in a week.

Sales volume of notebook computers of WH Computer Store in a week



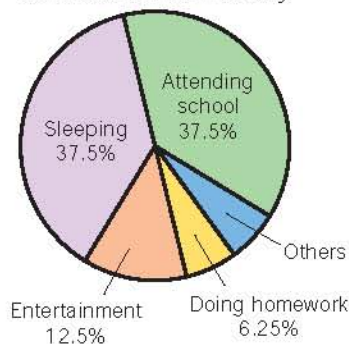
- How many notebook computers were sold on Wednesday?
 - Between which two days did the sales volume of notebook computers increase most rapidly? By how much did the sales volume increase?
 - Find the total sales volume of the notebook computers that week.
2. The following stem-and-leaf diagram shows the age distribution of the employees in a company.

Age distribution of the employees in a company

Stem (tens)	Leaf (units)
2	4 4 4 4 5 5 5 7 7 7 7 7 9 9
3	0 0 2 3 3 4 6 6 8 8 8
4	1 1 2 3 3 3 5 8 9
5	1 1 2 4 6 7 7
6	0 0 1 5

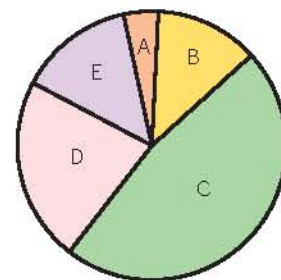
- How many employees are there in the company?
 - Which stem do most of the ages fall into? How many employees are there?
 - How old are most of the employees?
 - After the retirement of a 65-year-old employee, how many employees are older than 55?
3. The pie chart on the right shows the distribution of the time spent by Fanny on different items in a day.
- What percentage of time did Fanny spend on the two items which occupied most of her time?
 - What percentage of time did Fanny spend on other items? How much time did she spend?
 - How much longer did Fanny spend on entertainment than doing homework?

Time spent by Fanny on different items in a day



4. The pie chart on the right shows the grades obtained by 144 students in a composition.

Grades obtained by 144 students in a composition



- Measure the size of the angle at the centre corresponding to each grade.
- What percentage of these students get grade B in the composition? How many students are there?
- If students with grade D or below have to write one more composition, how many students have to write one more composition?

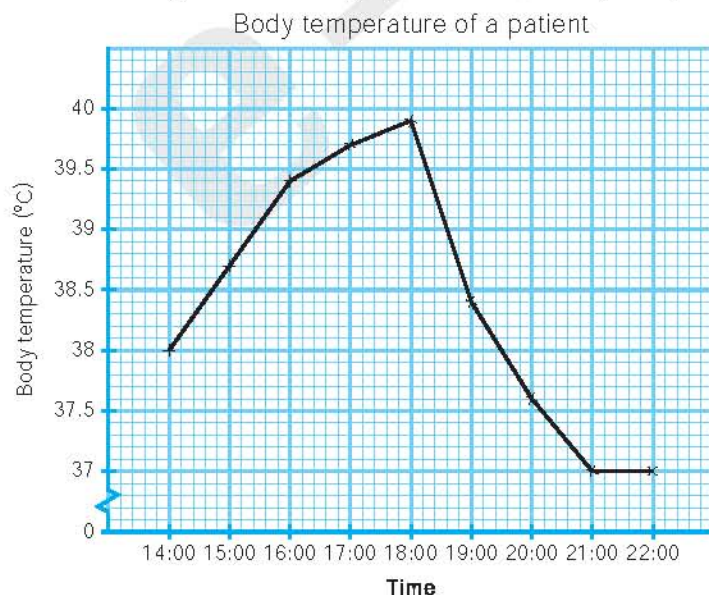
5. The table below records the lengths of a baby within 42 days after birth. Use a broken-line graph to present these data.

Days after birth	7	14	21	28	35	42
Length (cm)	50.7	52.0	53.1	54.1	54.9	55.8

6. The following are the scores of 32 students in an English Language test. Use a stem-and-leaf diagram to present these data.

60	71	57	88	56	75	84	62
58	66	62	73	85	60	49	67
45	76	80	59	88	86	65	78
68	52	92	67	90	79	87	46

7. The following broken-line graph shows the body temperature of a patient.



- When was the body temperature of the patient the highest?
- Estimate the body temperature of the patient at 19:30.
- Describe the changes in the body temperature of the patient within this period of time.

8. The table below records the expenditure of a company in March. Use a pie chart to present these data.

Item	Salary	Rent	Transportation	Others
Percentage occupied	25%	35%	30%	10%

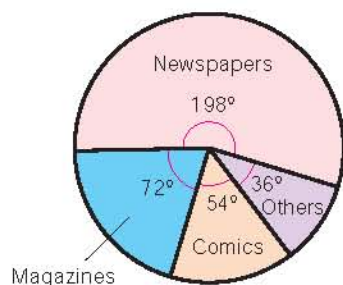
9. The table below records the opinions of some people towards a new policy. Use a pie chart to present these data.

Opinion	Supporting	Opposing	No comments
Number of people	252	156	72

Level 2

10. The following pie chart shows the sales distribution of Mr. Lee's news-stand last month.

Sales distribution of Mr. Lee's news-stand last month



- Which item accounts for most of the sales? What percentage of sales does it account for?
 - If the sales of magazines was \$9 000, find the total sales made by Mr. Lee last month.
 - Find the sales of comics.
11. The following stem-and-leaf diagram shows the distribution of the marked prices of the models sold in a shop.

Marked prices of the models sold in a shop

Stem (\$100)	Leaf (\$1)
0	39 39 45 69 70 99
1	00 25 29 29 49 80 80
2	10 30 49 80
3	20 59
4	20

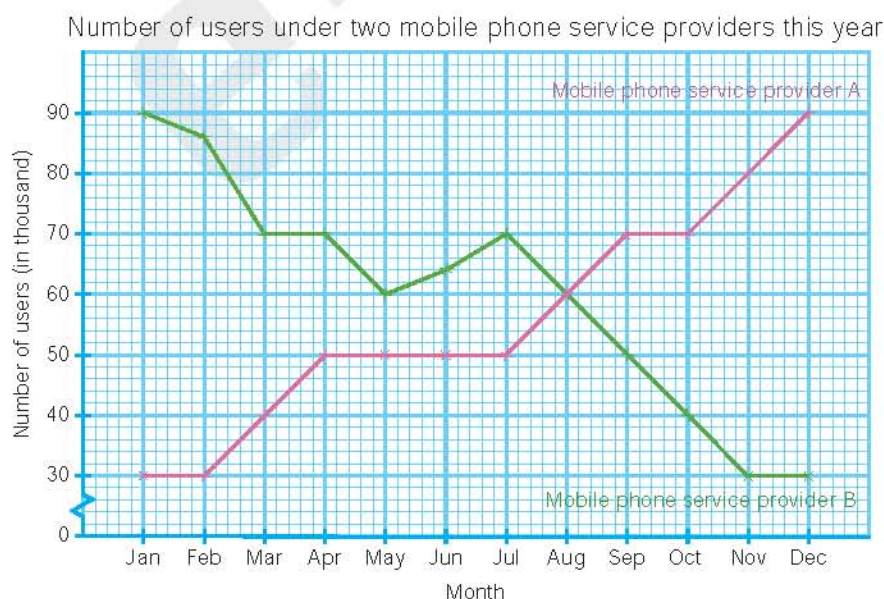
- What is the lowest marked price of the models sold in the shop?
- What percentage of the models in the shop have marked prices between \$100 and \$300 inclusive?
- If models with marked prices above \$350 are sold at a discount of 20%, what is the highest selling price among all the models in the shop?

12. The following broken-line graphs show the performance ratings of two tennis players from 1999 to 2006 (the full score is 10).



- In which year were the performance ratings of the two tennis players the closest? What is the difference?
- Describe the performance of the two tennis players between 1999 and 2006.
- Whose performance is more stable? Explain briefly.

13. The following broken-line graphs show the number of users under two mobile phone service providers this year.



- In which month was the number of users under the two mobile phone service providers the same?
- In which months was the number of users under mobile phone service provider B the same as that in March?
- Describe the changes in the number of users under mobile phone service providers A and B this year.
- Predict the trends of the number of users under mobile phone service providers A and B next year.

14. The following broken-line graphs show the number of *hours of reduced visibility* recorded at the Hong Kong Observatory in 2000 and 2006.

Number of hours of reduced visibility recorded at the Hong Kong Observatory



- In 2000 and 2006, which month had the fewest hours of reduced visibility?
- In 2000 and 2006, how many months had more than 100 hours of reduced visibility each?
- Which year had lower visibility in general? Explain briefly.

15. The following back-to-back stem-and-leaf diagram shows the air pollution index (API) recorded in districts A and B over the past 24 hours.

Air pollution index (API) recorded in districts A and B		
District A		District B
Leaf (units)	Stem (tens)	Leaf (units)
8 8 5 3 3 2 1 1	4	0 2 5 5
7 6 4 4 0 0 0	5	1 1 2 2 4 5
5 4 4 2 2	6	2 3 3 5 9
4 3 3 0	7	3 4 4 6
	8	0 2 3 5 5

Very high	200
	101
High	100
	51
Medium	50
	26
Low	25
	0

hours of reduced visibility 低能見度時數

- (a) Write down the highest and lowest API recorded in district A over the past 24 hours. What is their difference?
 - (b) Find the respective percentages of hours with API over 70 in districts A and B.
 - (c) By comparing the number of hours with high or very high air pollution levels in districts A and B, which district do you think was having poorer air quality over the past 24 hours? Explain briefly.
16. The following are the daily expenditures of Adam and Doris over these two weeks.
- Adam: \$30, \$45, \$22, \$24, \$6, \$118, \$0, \$29, \$28, \$15, \$39, \$24, \$72, \$42
- Doris: \$56, \$32, \$49, \$40, \$65, \$8, \$103, \$41, \$34, \$25, \$37, \$58, \$32, \$21
- (a) Use a back-to-back stem-and-leaf diagram to present the daily expenditures of Adam and Doris over these two weeks.
 - (b) Which of them do you think spent more each day in general? Explain briefly.



Chapter Summary

Term Introduced

[This is a quiz to check your understanding of some special terms in this chapter. Match items in column A to column B appropriately.]

Column A		Column B
1. Statistics	•	• (a) A diagram which uses sectors to represent the distribution of data.
2. Frequency	•	• (b) A table which shows the distribution of data.
3. Frequency distribution table	•	• (c) A study dealing with the collection, organization, presentation and analysis of data.
4. Broken-line graph	•	• (d) The number of times an item or an event appears.
5. Pie chart	•	• (e) A diagram which uses stems and leaves to represent data.
6. Stem-and-leaf diagram	•	• (f) A diagram which uses connected line segments to represent the changes in data.

Check Yourself

[This is a quiz to remind you of the basic concepts you have learned in this chapter. Each question tests a concept under the section listed on the right. Failure in any part of a question indicates a need to do a revision on the section listed.]

Section

6.2B

1. Organize the following data with frequency distribution tables.

(a) Results of throwing a dice 20 times

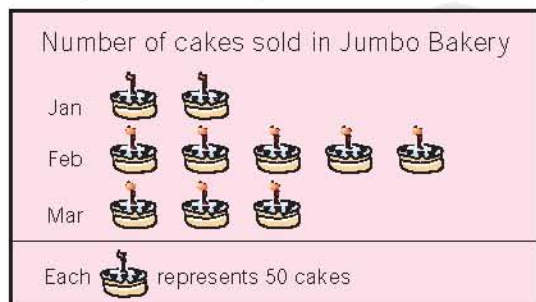
2	4	3	5	4	6	3	2	5	3
5	5	2	3	4	6	1	5	3	5

(b) Results of tossing a coin 20 times

Head	Head	Tail	Head	Tail	Head	Head	Tail	Tail	Tail
Tail	Head	Tail	Tail	Head	Tail	Tail	Head	Tail	Head

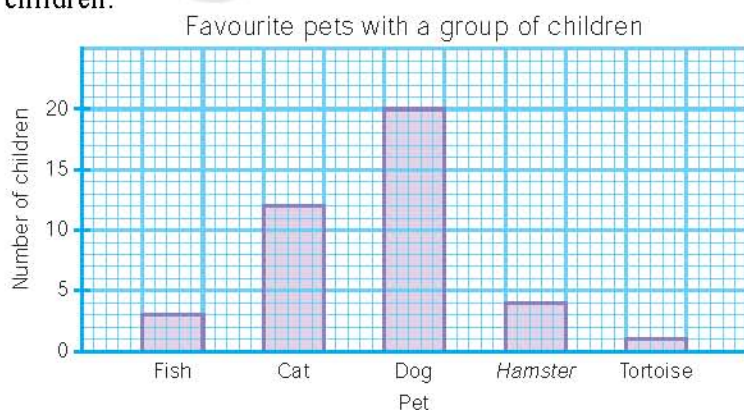
2. The following pictogram shows the number of cakes sold in Jumbo Bakery from January to March.

6.3A



- (a) In which month was the largest number of cakes sold?
 (b) How many cakes were sold in March?
3. The following bar chart shows the favourite pets with a group of children.

6.3B

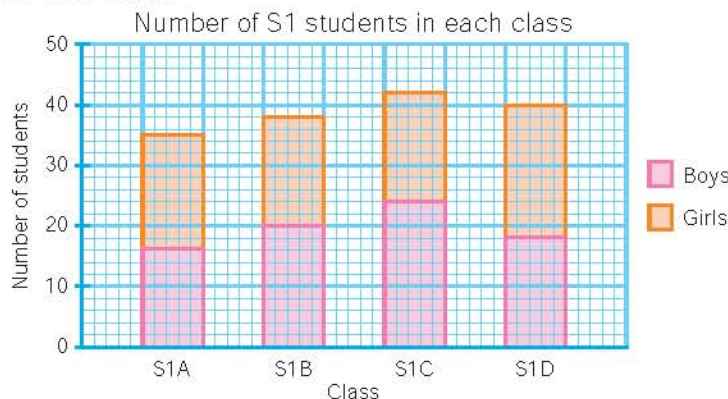


- (a) How many children like cats?
 (b) Find the total number of data recorded in the above diagram.

hamster 倉鼠

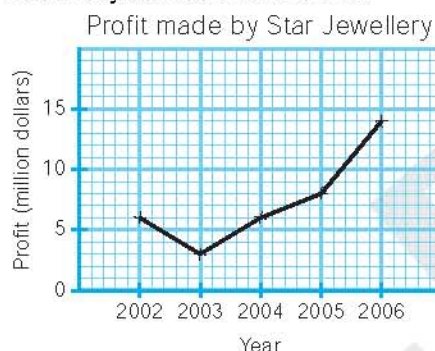
4. The following compound bar chart shows the number of S1 students in each class.

6.3C



- (a) Which class has more than 20 boys?
 (b) How many girls are there in S1A?
5. The following broken-line graph shows the profit made by Star Jewellery from 2002 to 2006.

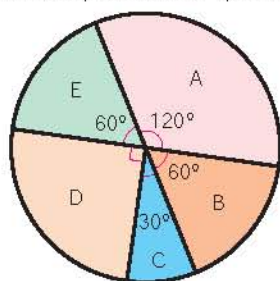
6.3D



- (a) The profit made by Star Jewellery increased most rapidly between _____ and _____.
 (b) What is the difference between the profits made in 2002 and 2003?
6. The following pie chart shows the choices of 36 students in a multiple choice question.

6.3E

Choices of 36 students in a multiple choice question



- (a) _____% of students have chosen D.
 (b) If the correct answer is A, how many students have answered this question correctly?

7. The following stem-and-leaf diagram shows the hourly wages of a group of people.

6.3F

Hourly wages of a group of people

Stem (\$10)	Leaf (\$1)
2	1 2 5 7
3	1 2 4
4	1 5 6 6 7 8
5	0 2 4 6 8
6	0 9

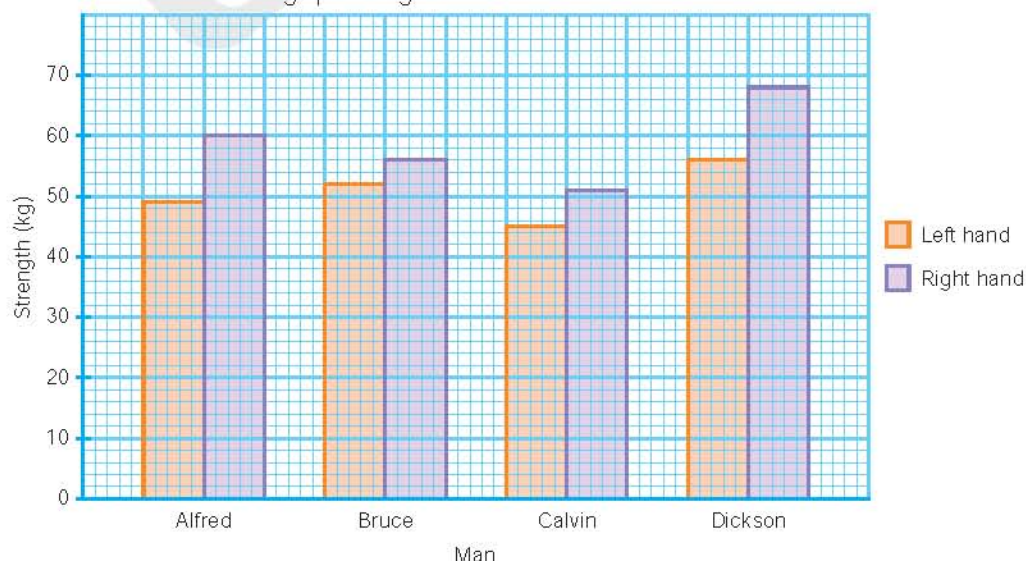
- (a) The above diagram records the hourly wages of _____ people.
 (b) What percentage of people are having hourly wages between \$40 and \$49?

Revision Exercise 6

Level 1

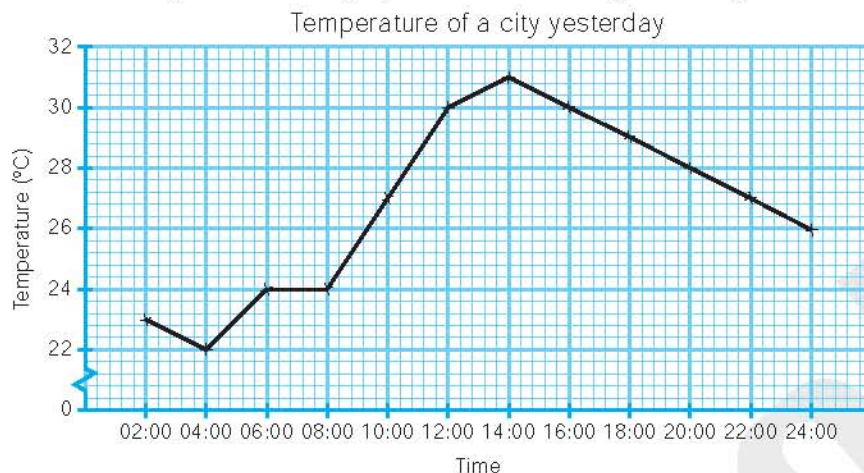
- Refer to the five data collection methods mentioned in this chapter (reading records, observation, experiment, interview and questionnaire), choose the suitable one(s) for each of the following statistical activities.
 - To investigate the destinations of the trams passing by a tram station in one hour
 - To investigate the amount of oil in Yang Chow Fried Rice served in 50 local restaurants
 - To study the changes in the electric bills of your family last year
 - To investigate the sizes of the flats which the S1 students are living in
- The following compound bar chart shows the *handgrip strengths* of both hands of 4 men.

Handgrip strengths of both hands of 4 men



handgrip strength 手握力

- (a) Whose handgrip strength of both hands are the weakest among the four of them?
 - (b) Whose handgrip strength of right hand is 56 kg? How much is the handgrip strength of his left hand?
 - (c) What is the difference in the handgrip strength between two hands of Alfred?
3. The following broken-line graph shows the changes in temperature of a city yesterday.



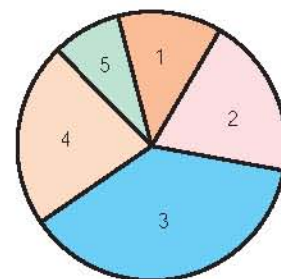
- (a) When was the temperature the highest yesterday?
 - (b) Estimate the temperature of the city at 05:00 yesterday.
 - (c) What was the increase in temperature from 06:00 to 12:00 yesterday?
4. The following stem-and-leaf diagram shows the scores obtained by 20 students in a piano examination.

Scores obtained by 20 students in a piano examination

Stem (tens)	Leaf (units)
8	8
9	0 5 6
10	3 4 4
11	2 5 5 7 8
12	0 1 3 3 6 9
13	2 8

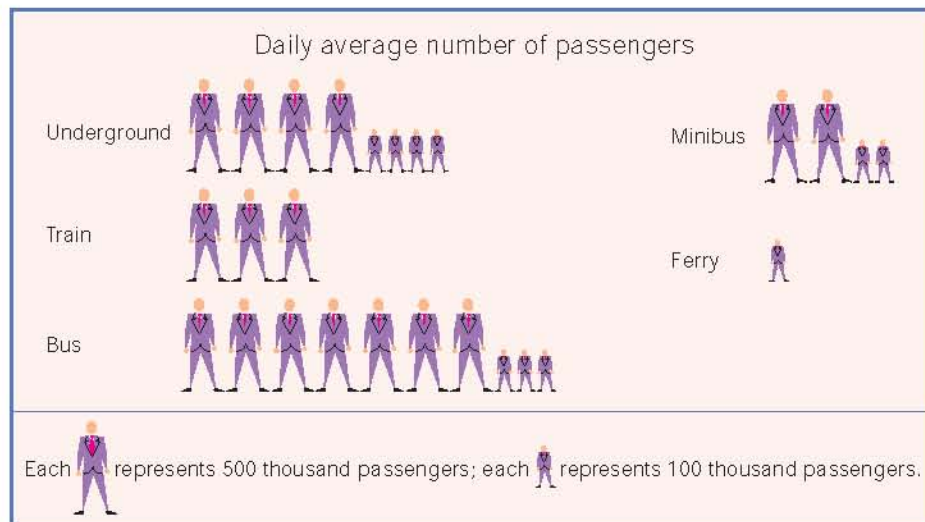
- (a) Which stem do most of the scores fall into?
 - (b) What are the scores of the three students with the worst results?
 - (c) If the passing score of the piano examination is 100, what percentage of the students have passed the examination?
5. The pie chart on the right shows the satisfactory levels of 180 people towards the *hygienic conditions* of a shopping centre (full rating: 5).
- (a) Measure the angle at the centre corresponding to each rating.
 - (b) What rating do most of the people give? What percentage of people give this rating?
 - (c) How many people give a rating of 4?

Satisfactory levels of 180 people



hygienic condition 衛生情況

6. The following pictogram shows the daily average number of passengers of different means of transport in a city this year.



- How many passengers does each represent? How many passengers does each represent?
 - Which type of transport has the greatest daily average number of passengers? Which type of transport has the smallest one?
 - Find the daily average number of passengers taking minibuses.
 - How many times of the daily average number of passengers taking trains is the daily average number of passengers taking underground?
7. The following are the number of words written by 30 students in a Chinese composition. Use a stem-and-leaf diagram to present these data.

299 285 300 316 325 306 312 324 285 278
 317 294 298 289 313 300 291 297 292 277
 283 305 290 294 286 295 299 301 290 308

8. (a) Miss Ho organized part of the votes on the class chairperson election with a frequency distribution table as shown below.

Candidate	Tally	Frequency
Frankie Chan	### ### /	
Vivian Cheung	////	
Eason Kwok	/	
Total		

The following are the votes left uncoun ted. Organize these votes with the above frequency distribution table.

Election of the class chairperson

Put a tick '✓' in the box corresponding to the candidate you support. (Only one tick is allowed.)

☐ Frankie Chan ☒ Vivian Cheung ☐ Eason Kwok

☒ Frankie Chan ☐ Vivian Cheung ☐ Eason Kwok

☐ Frankie Chan ☒ Vivian Cheung ☐ Eason Kwok

☐ Frankie Chan ☒ Vivian Cheung ☐ Eason Kwok

☒ Frankie Chan ☐ Vivian Cheung ☐ Eason Kwok

☐ Frankie Chan ☐ Vivian Cheung ☒ Eason Kwok

☐ Frankie Chan ☒ Vivian Cheung ☐ Eason Kwok

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Election of the class chairperson

Put a tick '✓' in the box corresponding to the candidate you support. (Only one tick is allowed.)

☐ Frankie Chan ☐ Vivian Cheung ☒ Eason Kwok

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☐ Frankie Chan ☒ Vivian Cheung ☐ Eason Kwok

☐ Frankie Chan ☒ Vivian Cheung ☐ Eason Kwok

☐ Frankie Chan ☐ Vivian Cheung ☒ Eason Kwok

☒ Frankie Chan ☐ Vivian Cheung ☐ Eason Kwok

☐ Frankie Chan ☒ Vivian Cheung ☐ Eason Kwok

(b) Use a pie chart to present the above data.

Level 2

9. The following compound bar chart shows the number of visitors arriving Hong Kong from 2001 to 2006.

Number of visitors arriving Hong Kong from 2001 to 2006

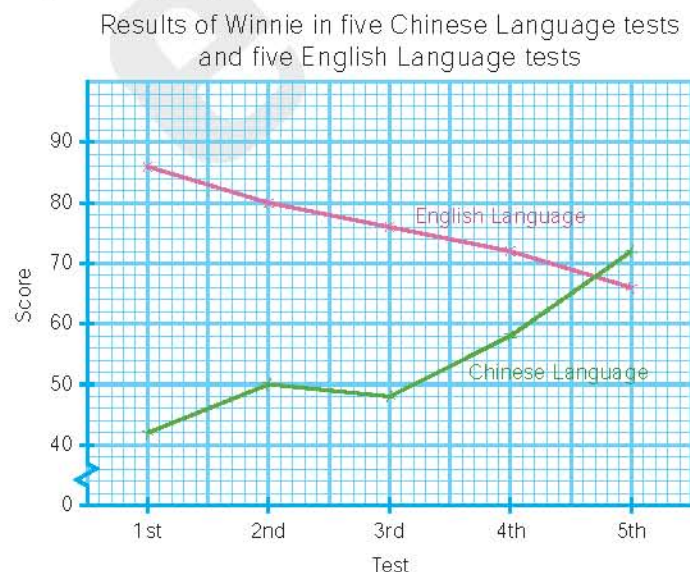


- In which year was the number of visitors arriving Hong Kong less than that in the previous year? Write down the respective number of visitors coming from Mainland China and from other regions that year.
- What percentage of the visitors arriving in 2001 came from other regions?
- In which years were there more than half of the visitors coming from Mainland China? Find the total number of visitors coming from Mainland China in these few years.

10. The following back-to-back stem-and-leaf diagram shows the distribution of the monthly salaries of the employees in two companies.

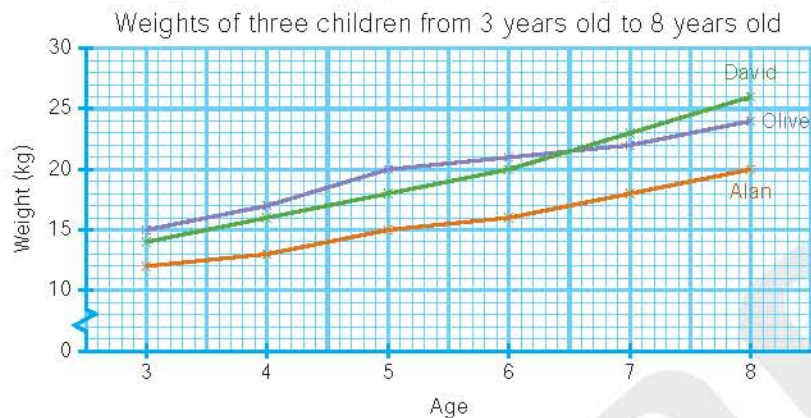
Monthly salaries of the employees in two companies		
Company A		Company B
Leaf (\$1)	Stem (\$1 000)	Leaf (\$1)
	4	000
500 500 200	7	500
	8	000
000 000	9	600
500 200 000 000	10	000
500 000	11	
300	12	000 000 500
500	13	000 000 000 500
	15	000 000 200 800
200 000	16	
	17	000 200
600	18	
400 000	20	000
000	22	400
000	24	

- (a) Find the number of data recorded in the above diagram.
- (b) Find the respective highest monthly salaries of the employees in company A and company B.
- (c) What percentage of employees in company A have monthly salaries higher than \$20 000?
- (d) How many more employees with monthly salaries between \$10 000 and \$15 000 inclusive are there in company B than in company A?
11. The following broken-line graphs show the results of Winnie in five Chinese Language tests and five English Language tests.



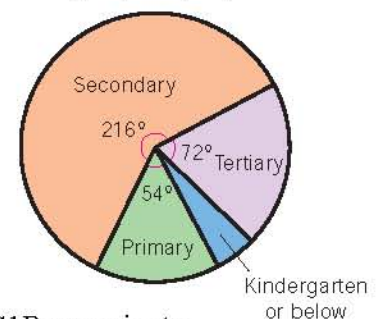
- (a) Describe the changes in the results of Winnie in the Chinese Language tests and the English Language tests.
- (b) Which subject, Chinese Language or English Language, do you think Winnie performed better in general? Explain briefly.
- (c) Predict the trends of the results of Winnie in the future Chinese Language and English Language tests.

12. The following broken-line graphs show the weights of three children from 3 years old to 8 years old.



- (a) How old was Alan when his weight was the same as David at 5 years old?
 - (b) Find the sum of the weights of the three children when they were 5 years old.
 - (c) For each of the three children, find the increase in weight from 3 years old to 8 years old.
 - (d) Compare the speeds of weight gain of David with Oliver's.
13. The pie chart on the right shows the educational levels of a group of people.
- (a) What percentage of people are up to primary level or above?
 - (b) What percentage of people reach only kindergarten level or below?
 - (c) If there are 15 people reaching only kindergarten level or below, how many people are there in total?
 - (d) How many people are up to secondary level or above?
14. The following are the number of sit-ups done by the girls in S1A and S1B per minute.

Educational levels of a group of people



Girls in S1A					Girls in S1B				
29	45	30	4	12	20	36	40	5	18
17	22	33	10	21	32	39	24	42	26
8	27	30	16	29	7	35	38	15	3
36	13	26	28	25	27	30	36	20	31

- (a) Use a back-to-back stem-and-leaf diagram to present the number of sit-ups done by the girls in S1A and S1B per minute.
- (b) In general, girls in which class can do more sit-ups per minute? Explain briefly.

MC Question

15. A basketball coach would like to investigate the distribution of the heights of the team members. Arrange the following steps in order.
- Arrange the data obtained in ascending order.
 - Use a stem-and-leaf diagram to present the data.
 - Measure the heights of the team members.
 - Observe the distribution of the heights from the stem-and-leaf diagram.
- A. I → III → II → IV
 B. III → I → II → IV
 C. III → II → IV → I
 D. III → IV → I → II



16. A shop owner would like to study the changes in the monthly sales of the shop last year. Which of the following data collection methods is the most suitable one?
- Interviewing the shopkeepers about the sales of the shop
 - Observing the sales of the shop himself
 - Checking the sales record of the shop
 - Distributing questionnaires to the customers



17. The following broken-line graph shows the stock price of a company over the past 6 months.

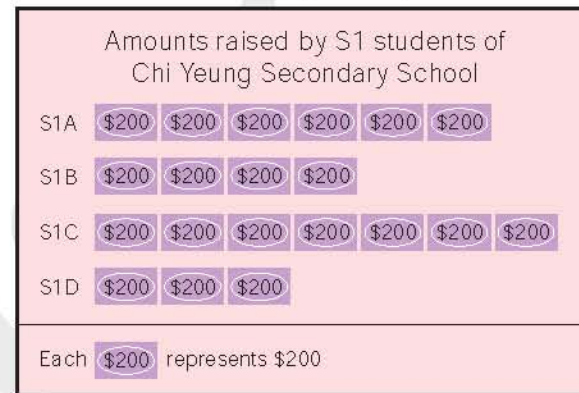


The stock price of the company in February was

- \$11.4.
- \$11.9.
- \$12.
- \$12.1.



18. The following pictogram shows the amounts raised by S1 students of Chi Yeung Secondary School in a fund raising activity.



Find the percentage of the amount raised by S1D students.

- 15%
- 20%
- 30%
- 35%



19. The following compound bar chart shows the employed population in a city from 1965 to 2005.

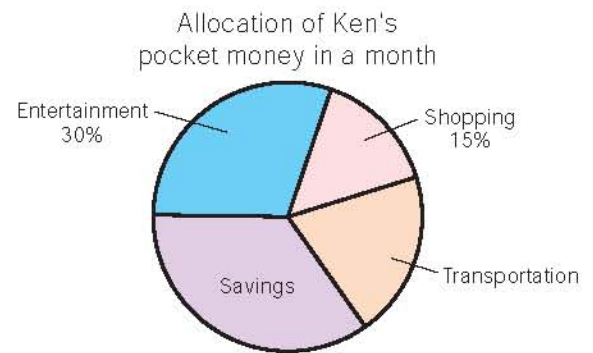


In 1995, the male employed population was more than the female employed population by

- A. 180 thousand.
- B. 200 thousand.
- C. 380 thousand.
- D. 580 thousand.



20. The following pie chart shows the allocation of Ken's pocket money in a month. Given that he got \$720 pocket money that month and he allocated \$144 for transportation, find the amount of his savings that month.



- A. \$216
- B. \$252
- C. \$316.8
- D. \$396



Problem-solving and Exploring



Hint for the Title Page Question

- (a) (i) Choose a passage in an English book at random, then record the number of times each letter appeared in the passage using the frequency distribution table below.

Letter	Tally	Frequency	Letter	Tally	Frequency
A			N		
B			O		
C			P		
D			Q		
E			R		
F			S		
G			T		
H			U		
I			V		
J			W		
K			X		
L			Y		
M			Z		

- (ii) Are the frequencies of the letters close to each other? List 10 letters which appear most frequently.
- (b) From the above statistical activity, explain why the number of tiles for each letter is not the same in a Scrabble.



Additional Question

1. The following is a *psychological test*.

Choose your favourite colour from the following.

- | | | |
|-------------------------------|---------------------------------|--------------------------------|
| <input type="checkbox"/> Red | <input type="checkbox"/> Yellow | <input type="checkbox"/> Green |
| <input type="checkbox"/> Blue | <input type="checkbox"/> Purple | |

- (a) Record the results of your classmates using a frequency distribution table, then use a pie chart to present the data obtained.
- (b) It is given that the analysis of the psychological test is as follows:
- Red You are an *optimistic* and *curious* person.
 Yellow You are a wise person with high standards.
 Green You are a bright and creative person.
 Blue You are a brave and active person.
 Purple You are a *sentimental* and friendly person.
- Analyze the personalities of your classmates briefly.
2. (a) Without using any measuring tools, estimate the length of the curve below, correct to 1 decimal place.



- (b) Collect the estimations made by other classmates and organize the data.
- (c) Use a stem-and-leaf diagram with stem 1 cm and leaf 0.1 cm to present the data obtained.
- (d) Obtain the actual length of the curve from your teacher, then analyze the estimations made by yourself and your classmates briefly.

psychological test 心理測驗
curious 好奇

optimistic 樂觀
sentimental 感性




A Constructing a broken-line graph

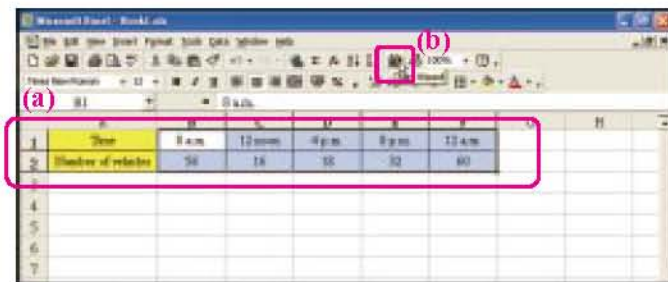
Aim: To construct the broken-line graph in Figure 6.4 (page 6.21) of Section 6.3D

Required software: Microsoft Excel

Procedures:

Step 1: (a) Input and select the required data.

(b) Click the icon .

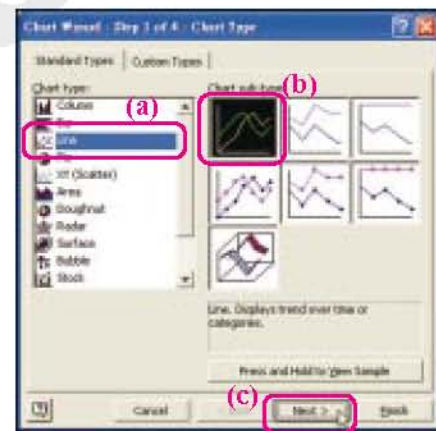


Step 2: For [Chart Type]

(a) Select [Line] under [Chart type].

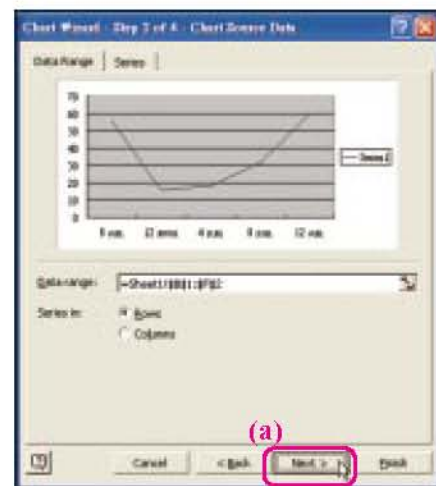
(b) Select [Line] under [Chart sub-type].

(c) Click the [Next] button.



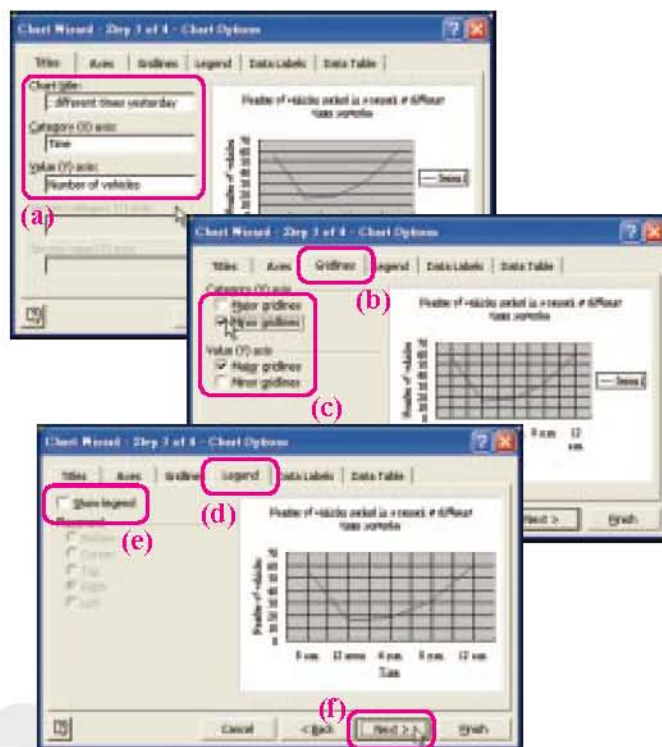
Step 3: For [Chart Source Data]

(a) Click the [Next] button.

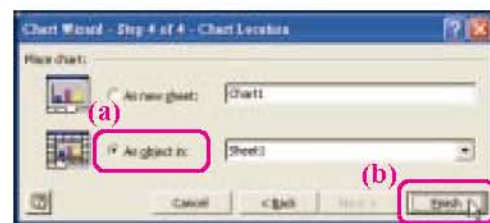


Step 4: For [Chart Options]

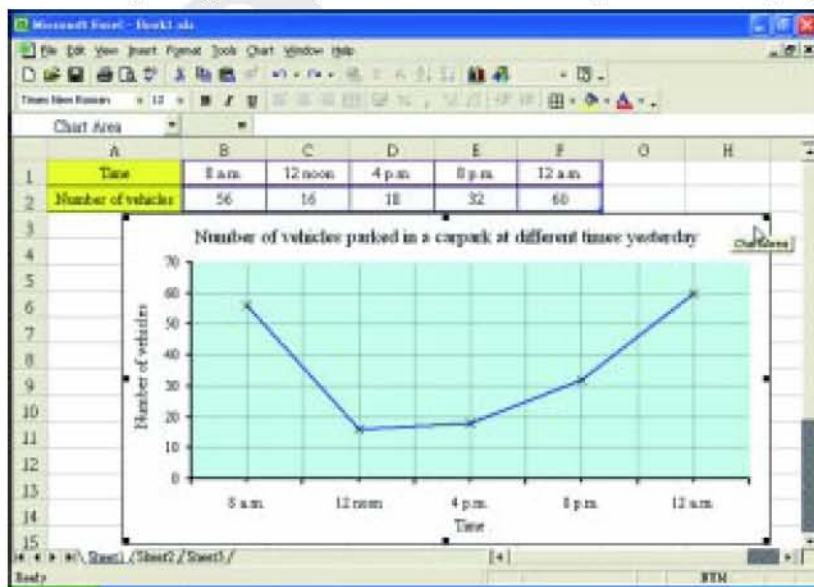
- Fill in the box for [Chart title] with 'Number of vehicles parked in a carpark at different times yesterday'; the box for [Category (X) axis] with 'Time'; and the box for [Value (Y) axis] with 'Number of vehicles'.
- Select [Gridlines].
- Mark the box [Minor gridlines] for [Category (X) axis]; and the box [Major gridlines] for [Value (Y) axis].
- Select [Legend].
- Unmark the box [Show legend] to hide the legend.
- Click the [Next >] button.

**Step 5:** For [Chart Location]

- Select [As object in].
- Click the [Finish] button.



After completing the steps above, the following broken-line graph will be obtained.



Practice

According to the data in question 5 (page 6.35) of Exercise 6C, draw a broken-line graph for the length of the baby within 42 days after birth.


B Constructing a pie chart

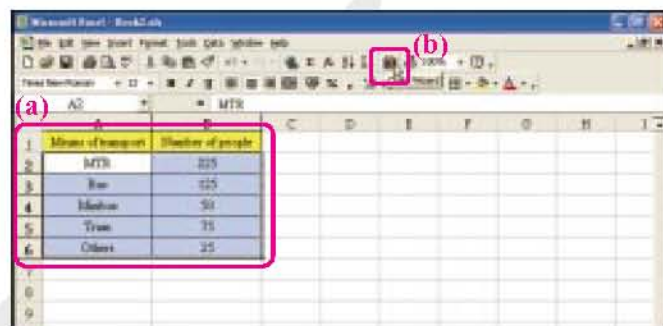
Aim: To construct the pie chart in Figure 6.6 (page 6.25) of Section 6.3E

Required software: Microsoft Excel

Procedures:

Step 1: (a) Input and select the required data.

(b) Click the icon .



Step 2: For [Chart Type]

(a) Select [Pie] under [Chart type].

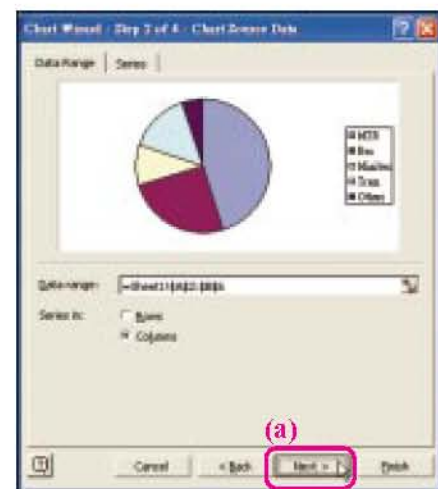
(b) Select [Pie] under [Chart sub-type].

(c) Click the [Next] button.



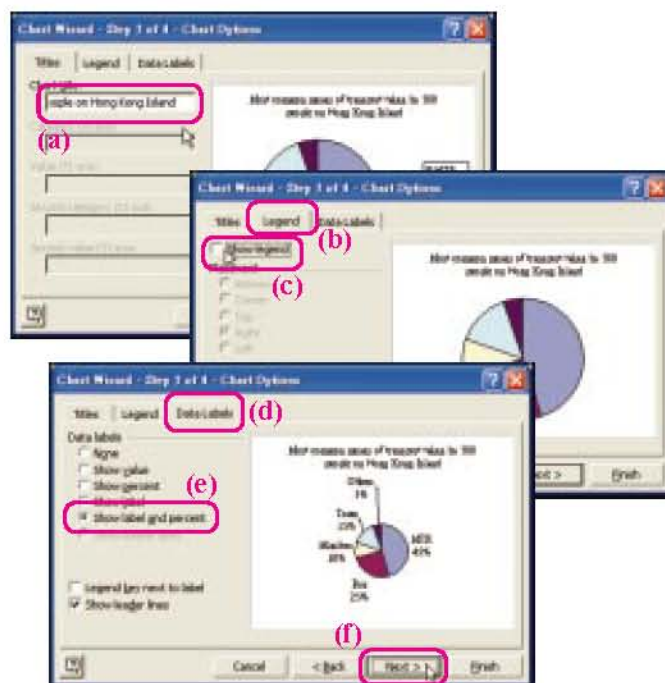
Step 3: For [Chart Source Data]

(a) Click the [Next] button.



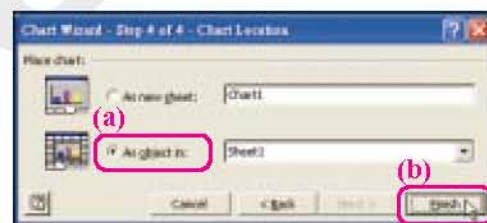
Step 4: For [Chart Options]

- Fill in the box for [Chart title] with 'Most common means of transport taken by 500 people on Hong Kong Island'.
- Select [Legend].
- Unmark the box [Show legend] to hide the legend.
- Select [Data Labels].
- Select [Show label and percent].
- Click the [Next] button.

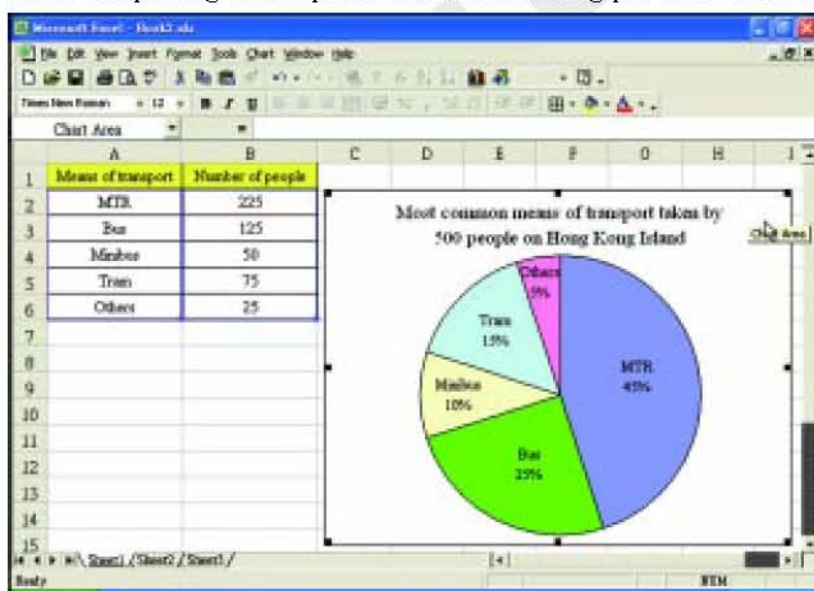


Step 5: For [Chart Location]

- Select [As object in].
- Click the [Finish] button.



After completing the steps above, the following pie chart will be obtained.



Practice

According to the data in question 9 (page 6.36) of Exercise 6C, draw a pie chart for the opinions of those people towards the new policy.

C Constructing a stem-and-leaf diagram

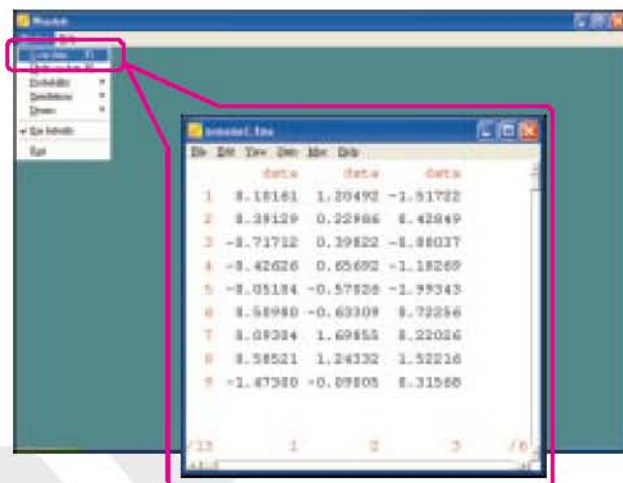
Aim: To construct the stem-and-leaf diagram in Figure 6.8 (page 6.28) of Section 6.3F

Required software: Winstats

(Note: Download from <http://math.exeter.edu/rparris/winstats.html>)

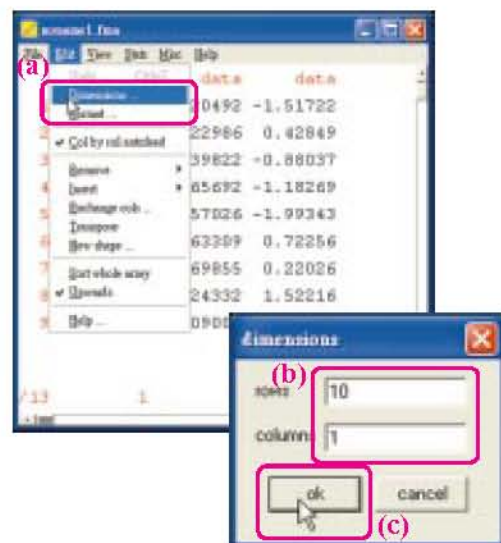
Procedures:

Step 1: Select [Window] > [1-var data].



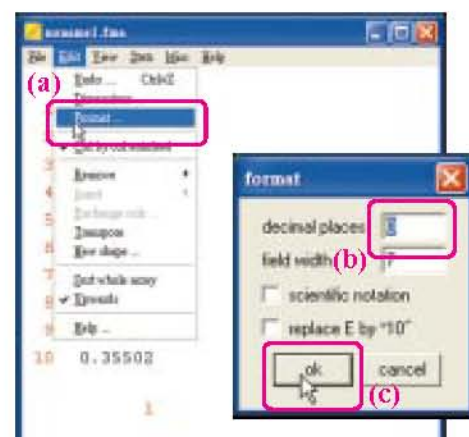
Step 2: Setting the number of data

- Select [Edit] > [Dimensions].
- Fill in the box for [rows] with '10' and that for [columns] with '1'.
- Click the [ok] button.



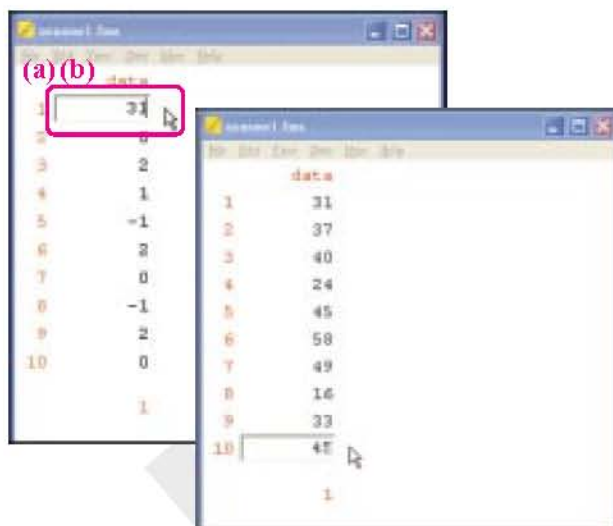
Step 3: Setting the display format of data

- Select [Edit] > [Format].
- Fill in the box for [decimal places] with '0'.
- Click the [ok] button.

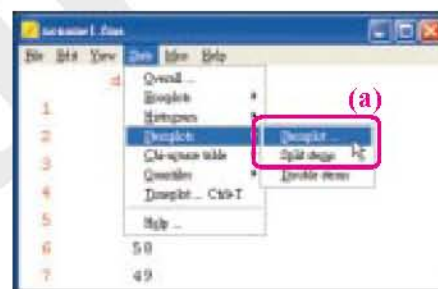


Step 4: Inputting the data

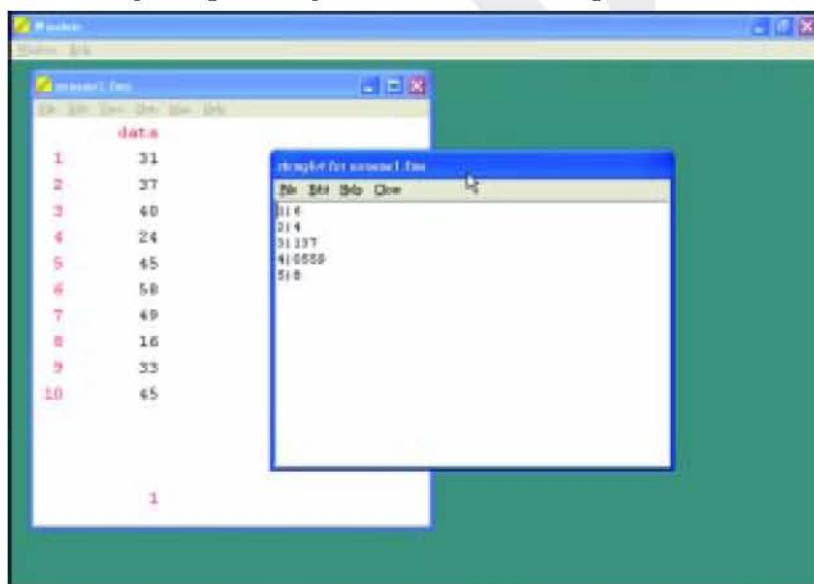
- Move the cursor to a location provided for inputting a datum, and then click the left button on the mouse.
- Type in the datum and then press **Enter**.
- Repeat (a) and (b) to input all data.

**Step 5:** Diagram display

- Select [Stats] > [Stemplots] > [Stemplot].



After completing the steps above, the following stem-and-leaf diagram will be obtained.

**Practice**

According to the data in question 6 (page 6.35) of Exercise 6C, draw a stem-and-leaf diagram for the scores of 32 students in the English Language test.